JANUARY, 1954

HEATING AND VENTILATING

INCLUDING AIR CONDITIONING – PIPING – REFRIGERATION – AIR SANITATION

Ventilation of Ships During Spray Painting Page 63

Contents Page 3

GRINNELL announces its new line of

GAS-FIRED UNIT HEATERS

Grinnell
Available in 7 sizes — with input ratings from 25,000 to 200,000 Btu's.
All parts readily accessible for periodic servicing.

AUTOMATIC! EFFICIENT! ASSURE YEARS OF DEPENDABLE SERVICE

Grinnell gas-fired unit heaters are easy to install, simple to operate and maintain. Efficient performance assured — with any type of gas — by modern design of burners and heat exchanger, proper motor and fan unit.

Automatic safety pilot operates to shut off main gas supply if pilot burner goes out. Flashback and extinction noise prevented by the burners' raised port design and proper port size for the gas used. Low speed motors have built-in thermal overload protection and automatic reset.

Additional features of Grinnell *gas-fired* unit heaters . . .

- Casing die-formed of heavy steel, with baked-on enamel finish
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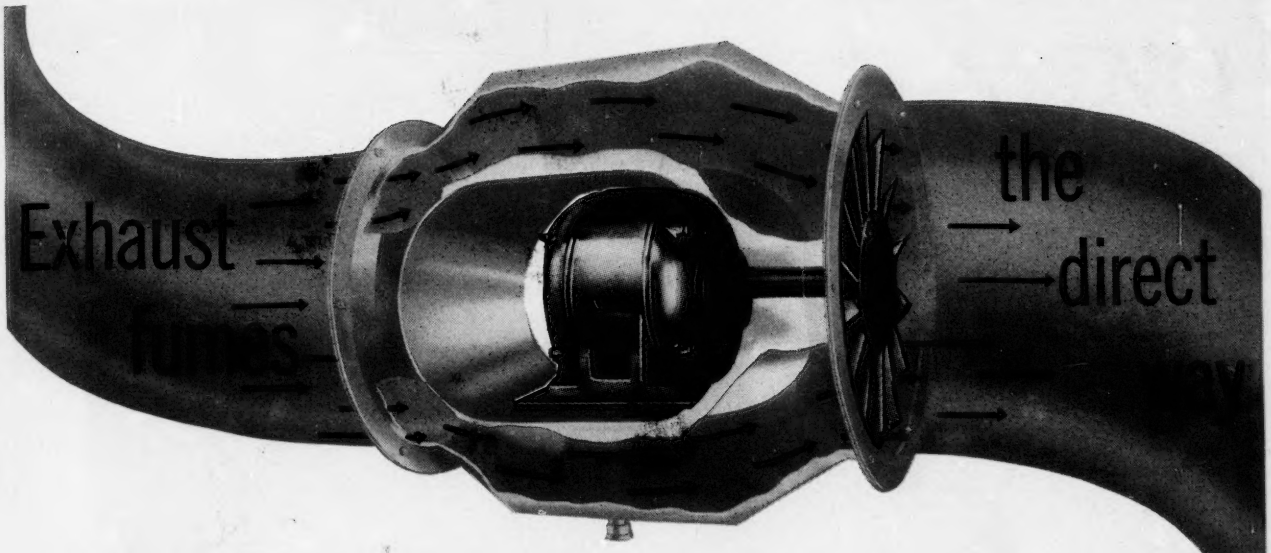
- Combustion chamber of heavy steel, welded
- Burners of close-grained iron castings
- Adjustable louvers
- Burners and control assembly removable as a unit
- Hinged bottom pan permits cleaning interior of tubes
- Threaded pipe hangers for easy suspension
- Only wiring required is connection to room thermostat or manual switch
- Approved by the American Gas Association

WRITE FOR CATALOG

GRINNELL
UNIT HEATERS FOR STEAM, HOT WATER, GAS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems



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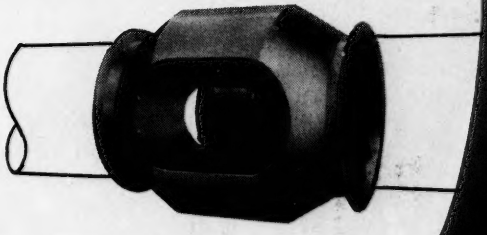
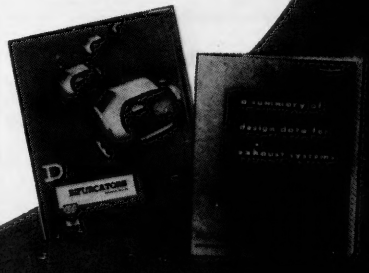
Bifurcator Fans exhaust fumes at *top efficiency* by avoiding a directional change in the air stream. Other fans often require a 90° change in direction of the exhaust stream with resultant loss in efficiency.

The fan motor stays clean, cool and accessible. Fumes are by-passed (bifurcated) around the motor chamber which is completely isolated from the exhaust stream.



Bifurcator Fan installs just like a section of ductwork.

A Bifurcator Fan is easily installed . . . just like a flanged section of ductwork. It can be mounted horizontally, vertically or at an angle. Lightweight and extremely compact, a Bifurcator requires no platform or supports. Bifurcators are available in sizes from 1140 CFM (12" diameter fan with 1/20 HP motor) up to 45,000 CFM (48" diameter fan with 20 HP motor). Housings and fan wheels can be fabricated of non-corrosive metals, or can be protected with a variety of corrosion-resistant coatings.



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Certified Ratings

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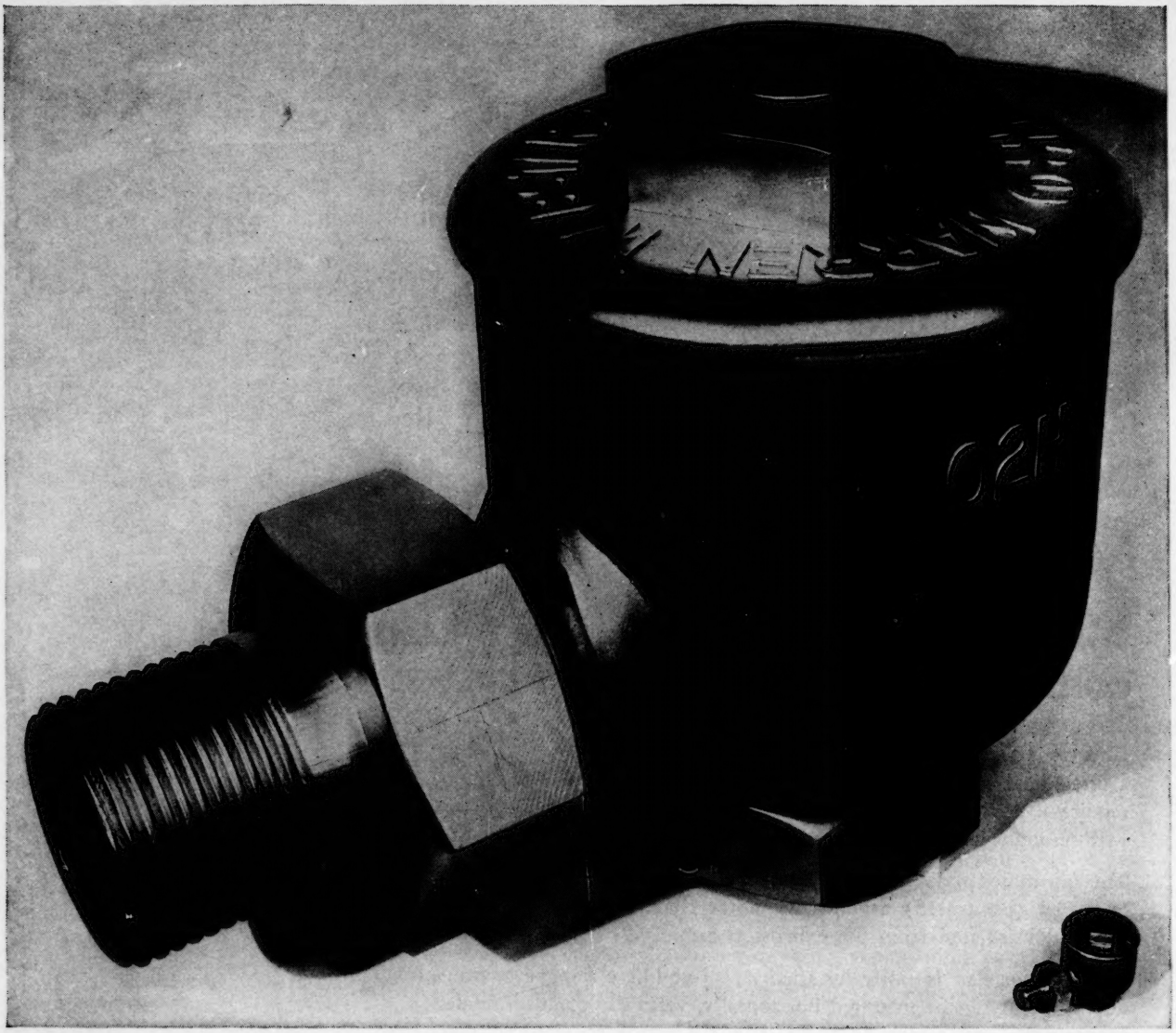
NAME AND TITLE _____



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If you need complete data on Webster Steam Heating and Process Steam Specialties, get this binder of bulletins. Write for your copy today. Ask for Bulletin C-536.

Long, trouble-free years of unfailing automatic performance . . . a service life as big as the giant model Webster Radiator Trap shown above. And low service costs throughout all those many years . . . costs as small as the actual Webster Trap illustrated at the lower right! These are the service extras built into every Webster Radiator Trap to give you consistent, dependable fuel conservation at low maintenance cost.

More service years per dollar, less service cost per year! These are two of the reasons why building owners, their architects, engineers and heating contractors have made this little trap a giant in the Heating Industry.

Like all other Webster Heating Equipment, Webster Traps are built up to performance, not down to a price. They hold steam in radiators or steam-using equipment until it has given up its useful heat. They provide complete, continuous, automatic discharge of air and water of condensation.

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HEATING AND VENTILATING

A MONTHLY MAGAZINE FOR ENGINEERS AND CONTRACTORS CONCERNED WITH THE DESIGN AND APPLICATION OF AIR CONDITIONING, REFRIGERATION, PIPING, PLUMBING, AIR SANITATION, HEATING AND VENTILATION IN BUILDINGS

January, 1954

VOLUME 51—NO. 1

The Cover: Vaneaxial fans with canvas duct outlets exhaust tank below deck while spray painting job is going on at Bethlehem Steel Co. ship yards in Sparrows Pt., Md. See page 63.

CONTENTS

Ventilation for Ship Construction and Repair—G. S. Reichenbach, Jr... 63
Electrical Measurement of Corrosion Rate ... 66
Residential Air Conditioning—E. P. Palmatier ... 67
Protecting the Trap Seal—H. E. Goss ... 71
Vermiculite Floor Cuts Brooder House Heating Costs ... 72
How Higher Courts Have Ruled—L. T. Parker ... 75
Commercial Air Cleaners—M. W. First and L. Silverman ... 78
Solution to Air Conditioner Water Shortage Problem ... 80
Design Factors in High Velocity Air Distribution—W. W. Kennedy ... 83
Bay Mussel Conquered by L. A. Steam Plant ... 85
Conditioning Wheat for Storage on the Farm—V. Martin ... 86
Resistance of Grains and Seeds to Air Flow ... 87
Corrosion Characteristics of Aluminum Cooling Towers ... 88
ASRE Has Air Conditioner Conference ... 89
Standards for Cast Iron Pipe ... 94

REFERENCE MATERIAL

Detail Sheet—Piping for Wall Hung Urinals ... 73
Data Sheet—Heat Removed Per Pound of Dry Air ... Opposite 150

DEPARTMENTS

Washington News—L. F. Overman ... 4
Briefly Stated ... 8
Picture Paragraphs ... 82
London Letter ... 91
What Would You Do? ... 93
News of Equipment and Materials ... 95
Product Applications ... 108
Experience is my Classroom—T. W. Reynolds ... 112
News of the Month ... 118
New Catalogs ... Opposite 122
Degree-Days for November, 1953 ... 134
Abstracts and Reviews ... 136
What Readers Say ... 138
Ad-Digest ... Opposite 138
Canadian Degree-Days for November, 1953 ... 140
Coming Events ... 140
Index to Advertisers ... 150

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Washington News

LORING F. OVERMAN

AT the turn of the year, with a new Congress ready to take over, and with many folks asking, "Where do we go from here?" the Eisenhower administration was continuing on its increasingly unpopular road toward cutting expenditures.

Trouble with cutting budgets is that folks lose jobs, manufacturers have contracts cut back or cancelled, and merchants report a lack of assurance among customers. These groups then become a vocal minority, setting up such a howl that they drown out those who feel that the economy will be in better shape after certain fats have been trimmed.

Dieting Painful

Obesity in individuals is being touted as Public Enemy No. 1, with dieting as the current craze. From Coast to Coast, men and women are counting calories; then suffering through the diet period in the hope that better health and appearance will be the reward. Whether they can take the same diet economically remains to be seen.

Business prognosticators point out that nobody actually starves on the type of treatment being prescribed, and that if the nation will only stick to its diet for a while longer, the results will be well worth it. On the other hand, at the first sign of a hunger pang, the average dieter is usually ready to throw up the whole project and call for second helpings. What the voter-dieters will do remains to be seen.

Fair Fare for '54

Meanwhile, Washington observers foresee a year of business so good that it would be hailed as phenomenal if it did not follow such record breakers as 1952 and 1953. Economists speak of the current situation as one of "rolling adjustment," with some lines experiencing cutbacks and others holding their own or forging ahead. It is this diversification that leads observers to conclude that the trend is not downward, but stable.

One of the important contributors to this stability is the rising population, with nearly 50,000 persons per week (approximately 2,500,000 per year), added to the consuming market. This increased population, observers note, represents the equivalent of adding a city of 50,000 persons to the economy every week. A new city per week to build homes for, and to provide furniture, rugs, heating, ventilating, air conditioning and the many other essentials and luxuries of life! This 2½ million is almost enough of itself to occupy the million homes which the construction industry keeps setting up (and reaching) as its annual goal.

New Housing Program

A new long-range housing program which would lower government expenditures in the home building field, while at the same time providing for increased slum clearance and aid to low-income groups, is being considered by the White House. The plan has been submitted by the President's 23-man Advisory Committee on Government Housing Policies and Programs. While not considered as a formal recommendation, the program represents the majority opinion of members of the committee.

In announcing the proposed program, Housing and Home Finance Administrator Albert M. Cole explained that it provides machinery needed to produce and consume more than one million housing units each year. The report to the President is broken down into six classifications, each having a bearing on the housing picture.

The following are covered:

(1) To encourage conservation and renewal in declining neighborhoods. Proposed is (a) a broader slum clearance program to aid communities in conserving areas worth saving, or for redeveloping worn-out areas; (b) a special fund of $5,000,000 to experiment in slum improvement; and (3) require communities receiving aid to show organized plans for attacking local problems.

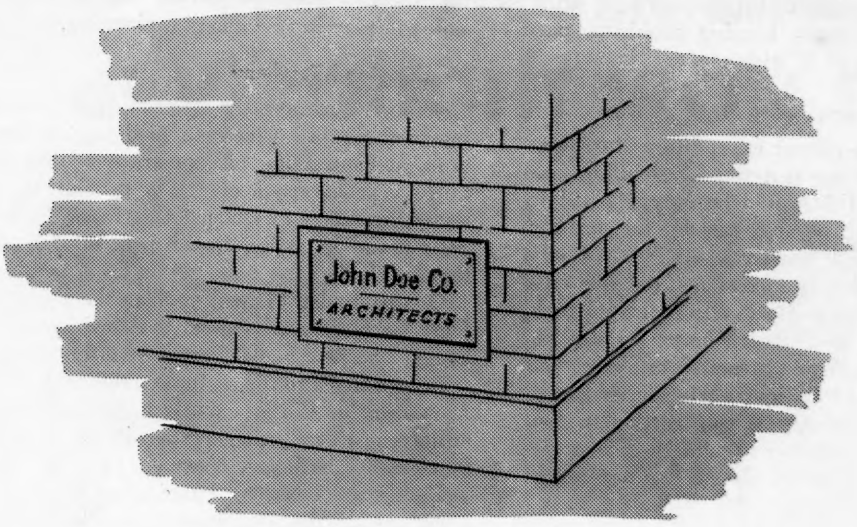
(2) To maintain and improve existing housing. (a) Equalize down payments and amortization terms on both existing and new housing, and (b), liberalize requirements for modernization and home repair loans. The first of these provisions might mean that down payments of as little as 5%, with 30 years to pay, could be arranged for both old and new FHA-insured mortgages. The second provision would permit up to $3,000 of FHA-insured money for modernization, payment to be made over a five-year period instead of the present three, with a $2,500 limit.

(3) Recommendations on mortgage market and home financing. (a) Establishment of a National Mortgage Marketing Corporation, federally chartered but privately financed, to provide a secondary market facility for FHA and Veterans Administration loans. This corporation would replace FNMA, a government agency which has been performing similar functions; (b) Raising of FHA and VA maximum interest rates to as much as 2½% above the current rate of outstanding long-term government bonds, and (c) Give study to proposals for a cooperative housing mortgage corporation.

(4) To encourage private building activities. (a) Liberalize FHA terms under Title II of the National Housing Act by increasing the maximum term for all home mortgages to 30 years, by raising percentages of FHA insurance on loans on one to four-family homes, multi-family rental housing and cooperative housing, and (b) study insurance rates, losses, etc., under FHA.

(5) Recommendations for housing low-income families. (a) A new two-year experimental program of 40-year 100% insured loans up to $7600 ($8600 in high cost areas) to house low income families; (b) Provision for lease-purchase contracts permitting renters to buy if their incomes improved; and (c) continuation of public housing program with further consideration to special problems.

Also provided for in the recommendations is a single housing agency covering the same basic functions as the Housing and Home Finance Agency. Suggested is a Statutory Advisory Board made up of the heads of the five constituent agencies and the Veterans Administration, to review major policy questions.



Is Destructive Condensation Jeopardizing Your Reputation?

SPECIFYING on a "take-it-for-granted" basis, some architects and builders with their own hands sow the seeds of destruction inside the walls of buildings they are so proud of.

A sturdy, frame house in Pennsylvania, for example, had to be moved. But it was found that the sills had rotted away. Inside the walls was ordinary insulation and no metallic vapor barrier.

A large brick and steel apartment development in the suburbs; a huge housing project in a big city; each caused great expense to its sponsors when ordinary insulation inside walls failed to prevent excess vapor flow, excess condensation formation, resulting in peeling paint and crumbling plaster.

Reputations as well as buildings are guarded by the use of multiple accordion aluminum. Its continuous metal sheets, 500 ft. to 750 ft. long, are impervious to water vapor. Infiltration under flat, stapled flanges is slight.

The scientific construction of multiple layers of accordion aluminum, fiber, and air, minimizes condensation on or within this type of insulation.

Of all heat flow through structural spaces, 50% to 80% is Radiation; 7% Conduction; the rest Convection. Multiple accordion aluminum surfaces have a reflectivity of 97% for Radiation or radiant heat, and an emissivity of only 3%. The aluminum and fiber sheets retard outer and inner Convection. The alternating layers of air spaces have low density and therefore slight Conduction.

The improved* multiple accordion aluminum, Infra Type 6-S*i* and 4-S*i* gives the entire area between joists maximum, edge to edge, uniform depth protection against heat loss and condensation formation. Write for sample and description.

*Patent applied for

COST OF INFRA INSULATION INSTALLED
in new construction between wood joists, material with labor,

Type 6-S*i* under 9½¢ sq. ft.
Type 4-S*i* under 7½¢ sq. ft.

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Administrator Cole has classified the report as a "stimulating new approach to many housing problems, particularly valuable because of its wide scope."

Plant Construction Continues

Latest estimates of first-quarter expenditures for plant expansion and equipment are that the $27.9 billion annual rate will continue. This would be only 1% below the final quarter of 1953. The peak rate for the postwar boom, set during the third quarter of 1953, was only 5% above the expected first quarter rate. Advance estimates of overall construction for 1954 also indicate a high level of activity. When all the chips are counted for 1953, it is considered likely that the construction total for that year will be above the $34.6 billion previously estimated by government people. Spending for construction in November was at the highest rate for the month in history. Although down 7% from October, the decline was much less than the usual seasonal drop.

PAD Duties Extended

Year-end indications were that the Petroleum Administration for Defense (PAD) would remain in business for two or three months before turning the reins over to a reactivated Oil and Gas Division in the Interior Department. The National Petroleum Council recommended such a procedure at a meeting in Washington during December.

It is expected that all of PAD's authority, except the power to issue directives, will be transferred to the OGD. That group would then continue PAD's information gathering facilities—providing up-to-the-minute data on production capacity, refining capacity, transportation capacity, well-drilling activity, and so on. The OGD would also be made responsible for advising on the issuance of certificates of necessity for the rapid amortization of defense-required facilities.

Many Expansion Goals Incomplete

Many of the 68 expansion goals set up by the Office of Defense Mobilization remain to be completed, according to ODM Director Arthus S. Fleming. Some of the expansion programs of possible interest to heating-ventilating folks, and not yet up to the strength announced as required for full scale defense, are as follows:

Asbestos, Chrysatile, strategic grades, 40% completed; Compressed gas cylinders, 40% complete; large gas pipe lines laid, 27% complete; small gas pipelines laid, 24%; gray iron casings, over 3,000 pounds, 5% complete; natural gas liquids capacity, 30%; domestic crude oil refining capacity, 30%; domestic oil pipe lines, 63%; oil storage facilities, 25%; scientific instruments, 65%; tankers, ocean-going, 26%; steam turbines, 49.2%.

Modified DMS Plan Approved

A plan for the modification and maintenance of the Defense Materials System (of allocating metals for defense needs) has been approved by the Steel Products Industry Advisory Committee. The plan, which covers only "A" products, eliminates most of the paper work, and simplifies the method of estimating requirements and passing allotments on to subcontractors.

Review of the DMS was only a small part of the work of the committee. Much time was devoted to the role that the new Business and Defense Services Administration will play in mobilization planning.

Washington Miscellany

Military Procurement Offices Listed. Two new booklets intended to aid businesmen in doing business with government contracting officers are available through local military procurement offices, or through the office of Assistant Secretary of Defense Charles S. Thomas, Office of Supply and Logistics, Department of Defense, Washington 25, D. C.

One pamphlet, "How to Sell to the Department of Defense," replaces three booklets issued by military departments. The new booklet gives essential sales information —for the first time in a single publication—about Army, Navy, Marine Corps and Air Force, as well as all joint military procurement agencies such as the Armed Services Petroleum Purchasing Agency.

The second booklet, "Purchased Items and Purchasing Locations of the Department of Defense," provides a cross-reference between general classes of commodities and the defense procurement locations responsible for the purchase of such items. The pamphlet also explains how to obtain invitations for bids.

Synthetic Fuel Cost Being Lowered. With atom power winning most of the headlines, it is interesting to note that the Bureau of Mines is continuing quite successfully, its projects to convert coal into liquid fuels. In a report to the Bureau of Mines coal-to-oil advisory committee, Assistant Secretary of the Interior Felix A. Wormser told of gradual reductions in the cost of converting coal to oil, as compared with making oil out of shale.

He observed that oil shale reserves might not permit a production of more than 1,000,000 barrels daily, whereas enough coal reserves are available to permit a conversion of ten times that amount "for several hundred years." He noted that one technologist has estimated that total U. S. needs for liquid fuels can be met from domestic petroleum production for the next 15 years, while another estimates that by 1965 it will become necessary to supplement such production and imports with oil-from-shale conversions. The same technologist estimates that by 1970 the oil-from-coal process will be needed and used.

"It is likely," said Assistant Secretary Wormser, "that the next large increase in the demand for coal will come during the next decade for production of high B.t.u. gas in places where existing natural gas pipelines traverse areas containing large deposits of coal relatively close to urban centers." He said that work of the Bureau of Mines on coal gasification at Morgantown (W. Va.) and on catalytic gas reactions at Bruceton (Pa.) will help industrial companies now engaged in or considering research on this problem.

New Shale Resources Reported. A new Geological Survey report summarizes the geology and oil-shale resources of a 385-square-mile area in Western Colorado. The report estimates that the area is capable of producing slightly less than 5 billion barrels of oil in shale beds averaging 30 gallons of oil per ton; slightly more than 11 billion barrels in shale beds averaging 25 gallons per ton, and about 28 billion barrels in beds averaging 15 gallons per ton. Information about this and other surveys are available from the Distribution Section, Geological Survey, Denver Federal Center, Denver, Colo., and from the Survey Chief of Distribution, Washington 25, D. C.

The LONGER LIFE of WROUGHT IRON PIPE

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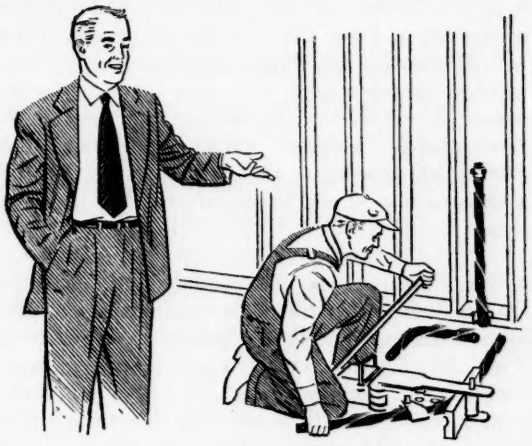

It costs less to do it right

—than to do it over!

When you specify pipe there are two things well worth remembering—

1. When you install it, you pay only the pipe fitter,

but

2. Every time you repair it, you pay pipe fitter, carpenter, mason, plasterer, and painter.

This dollars-and-cents difference underscores the fallacy that low-first-cost materials are the answer to piping economy. And these same facts provide a yardstick that places the economy emphasis where it rightly belongs . . . on PIPE SERVICE LIFE. The longer service life of wrought iron pipe has proved to thousands of users that it costs less to do it right than to do it over. In installation after installation, wrought iron pipe has doubled, tripled, and even quadrupled the useful life previously obtained from low-first-cost piping. These users have discovered that although you pay a little more for wrought iron, you pay a LOT LESS FOR MAINTENANCE. Wrought iron gives you piping economy because it lasts longer, at lower cost per year.

We'll welcome the opportunity to discuss your particular corrosion problems, and to show you wrought iron durability records in services similar to those in which you are interested. Write or call. Your request will be handled promptly.

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Why Genuine Wrought Iron Lasts

This notch-fracture test specimen illustrates the unique fibrous structure of wrought iron—which is responsible for the high corrosion resistance of the material. Tiny threads of glasslike silicate slag, distributed through the body of high-purity iron, halt and disperse corrosive attack, and discourage pitting and penetration. They also anchor the initial protective scale, which shields the underlying metal.

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

BRIEFLY STATED

• Richard E. Hoierman has been named advertising manager for the Machinery Division of Dravo Corporation and the Dravo-Doyle Company, a subsidiary. Mr. Hoierman succeeds Robert C. Black who has been transferred to the sales staff of the division's heating department. Since 1950, Mr. Hoierman has been assistant to the director of advertising of Cooper-Bessemer Corp. He formerly was with the advertising staff of Westinghouse Electric Corp. at Mansfield, Ohio.

• William J. Thomas, general sales manager, has been appointed general manager of the Tubular Products Division of The Babcock & Wilcox Co. and Paul J. Utnehmer, works manager, has been named to the board of directors of the division. Mr. Thomas has been with B&W since 1932. He was associated with the Boiler Division of the Company at Barberton, Ohio until 1941 when he left his position as assistant manager of the process equipment department to join the Tubular Products Division. Mr. Utnehmer has been with Babcock & Wilcox since 1945. Prior to coming with B&W he was associated with a nationally known management engineering firm and during World War II was a management engineering consultant for the Air Force in its production program.

• The recently completed construction of two new buildings, for the Detroit and Greensboro, N. C., branches, has been announced by Johnson Service Co., Milwaukee manufacturers of automatic temperature and air conditioning control systems. The Detroit building, at 840 Hilton Road occupies 6,300 sq ft, and the Greensboro building occupies 5,000 sq ft. Both buildings are air conditioned.

• On October 6th the Power Fan Manufacturers' Association was formed. Formerly the Propeller Fan Manufacturers' Association, the new organization is a consolidation with a group of twelve power roof ventilator manufacturers. It now has thirty-four Members whose products cover axial fans, propeller fans, power roof ventilators, window, kitchen, and attic fans. The primary purpose of the Association is to establish accurate delivery ratings. Offices are in Detroit.

• Joseph S. Topp has been appointed staff specialist in charge of residential air conditioning promotion, Airtemp Division of Chrysler Corp. Joining Chrysler Airtemp in 1947 as a field engineer, Mr. Topp has served in various sales and engineering capacities. Recently he was executive engineer for the Washington, D. C. region.

• Two major executive appointments at Affiliated Gas Equipment, Inc., were announced recently. James A. Hughes, a vice president of AGE and general manager of the Bryant Heater Division since 1951, has been appointed assistant general manager of AGE in addition to his regular duties as Bryant general manager. Howard L. Clary has been appointed assistant general manager of Bryant Heater Division. Mr. Clary has resigned his former position as vice president of Norge Division of Borg-Warner Corporation.

• Emerson Radio and Phonograph Corporation has acquired a majority interest in Quiet Heet manufacturing Corp., manufacturers of air-conditioners and oil burners. The Quiet Heet Co. of Newark, New Jersey, organized in 1936, will be operated as an Emerson subsidiary and will continue under existing management. In addition to producing its own line, Quiet Heet will produce some room and house air-conditioners to be marketed under the Emerson name.

• Bell & Gossett Co., Morton Grove, Ill., manufacturers of heating and air conditioning equipment, has merged with Marlow Pumps, Ridgewood, New Jersey. The merger involves an interchange of shares between the two companies. A. S. Marlow, Jr. becomes a vice president and director of Bell & Gossett and general manager of Marlow Pumps, which will operate as a division of Bell & Gossett. Marlow will continue to manufacture its regular line of pumps.

• Organization of a new manufacturers' association—the Institute of Environmental Equipment Manufacturers—has been announced. Its headquarters will be in New York, N. Y. Environmental equipment simulates low temperatures, high temperatures, salt-spray, sand-storm, rain, altitude, etc. It is used for laboratory testing of equipment to be used by the military and to determine the effects of weather on certain consumer items. It is also used in manufacturing processes—for example, to cool rubber so that it can be machined, to shrink metal parts for shrink fitting. The Institute will supply industry with technical data on environmental testing.

• A program for franchising domestic oil-burner control distributors has been established by the General Electric Co.'s Appliance Control Department to help market its new line of home-heating controls. The new plan calls for a complete education program whereby heating control servicemen throughout the country will be made familiar with the controls.

• The National Radiator Co. of Johnstown, Pa., announced recently that it had purchased from the owners the principal assets of Viking Air Conditioning Corp., Cleveland, Ohio. Marion I. Levy, president of Viking, has been elected a vice president of National Radiator and named general manager of the former Viking operations in Cleveland which will be continued under the name of Viking Air Conditioning Division of The National Radiator Co.

• Owners of the Fidelity Philadelphia Trust Building have signed a contract for the largest air conditioning system ever installed as one project in an existing building, it was announced recently by Carrier Corporation. The new year-round system will have a cooling capacity of 2,500 tons to condition 29 floors and 618,248 ft of office space. The installation will be made without business interruption.

• Worthington Corp. in November took occupancy of its new plant in Decatur, Ala., for the manufacture of air conditioning equipment. The Decatur works will produce packaged air conditioning units for commercial and year-round residential use.

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choose easy-to-join

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Albany †	Cleveland	Kansas City, Mo.	New York	San Francisco
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BARBER COLMAN

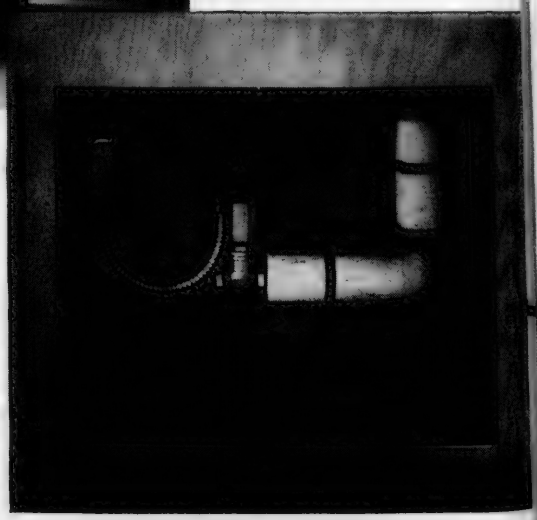
ELECTRIC Control Center

Modern electric control system provides low-cost solutions to heating and ventilating problems at TIERRA LINDA SCHOOL

Location: San Carlos, California. *Architect:* John Lyon Reid. *Consulting Engineer:* Dwight Coddington. *Heating Contractor:* Schlegel Plumbing Contractors, Inc.

As modern as the building design itself are the electric temperature control and air distribution systems installed in Tierra Linda Grade School. Atmospheric conditions are provided which contribute to the alertness of students and faculty, yet require minimum attention and expense. Each area having specialized requirements is individually engineered. Unitary control systems are readily accessible for checking . . . servicing of one unit does not require a shutdown of the complete system.

Auditorium is a multi-purpose room. Eight Barber-Colman Uni-Flo Diffusers discharge air downward along each outside wall. Eight return grilles are mounted along each wall near the center of the ceiling. Result: healthful, draft-free air distribution under all conditions.



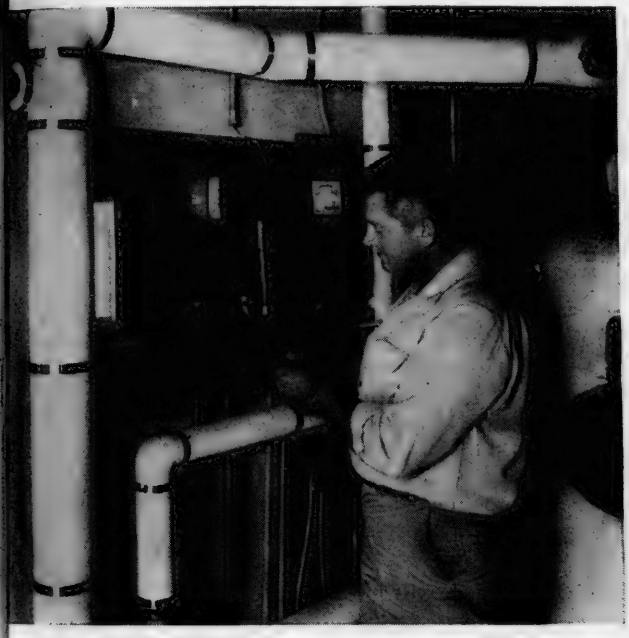
Room thermostats on walls control compact motor-operated valves installed in partitions of classrooms. Temperature of each room is controlled independently within close limits for comfort of occupants.

How an improved heating and ventilating system results from combined "know-how" on electric controls and air distribution products is exemplified in this excellent example of contemporary school housing. In an area of 39,106 square feet, seventh- and eighth-grade students are provided with eighteen classrooms, locker and shower rooms, music room, library, materials center, toilets, closets, a general-purpose room, and administrative offices.

Classrooms and offices have radiant panel heating; the multi-purpose room has a separate ventilating system; the kitchen has unit heaters; the dining room, convectors. All areas are served by a central boiler plant.

Over-all benefits include: (1) automatic electric operation, requiring minimum attention from the custodian, yet permitting optional manual control; (2) a decrease in anticipated fuel and electric consumption; (3) low-cost installation in widely separated buildings; (4) satisfactory operation with low maintenance costs.

Pleasantly surprising to the architect, consulting engineer, and contractor were the lower installed costs for improved Barber-Colman electric control systems. Similar pleasant surprises are being experienced throughout the country as investigations reveal the many advantages of newest types of electrical controls for many types of buildings. For the complete story on modern control techniques, including the B-C "Control Center" method, phone nearby field office (consult classified directory) or send coupon below.



Big cost-saving factor was Barber-Colman technique of placing modern "Control Center" in boiler room. Here, at one central junction point, are prewired accessories and numbered terminal strips for connecting all electrical components of each unitary control system. Included here are proportioning-type, adjustable-ratio, outdoor reset controls actuating proportioning-type, motor-operated valves for supplying hot water to radiant heating system and controlling fan operation. Individual systems can be checked or revised at "Control Center" cabinet.

Utilization of space is visualized here by installation of unitary control components in recess behind wall cabinets. No floor space is used, yet electric controls are readily accessible.

One responsibility for automatic control and air distribution products pays off!

By engineering, manufacturing and supervising installation of *both* electric controls and air distribution equipment, Barber-Colman is in a unique position to solve problems for the heating, ventilating, and air conditioning industry. Centering of these responsibilities in one manufacturer avoids arguments, gives greater assurance of operating satisfaction, guarantees results!

BARBER COLMAN

ELECTRIC

Control Center

Automatic Controls • Air Distribution Products • Industrial Instruments
Aircraft Controls • Small Motors • OVERdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

BARBER-COLMAN COMPANY, ROCKFORD, ILL., U.S.A.
Dept. B, 1302 Rock St. • Field offices in principal cities

☐ Send free copy of new booklet "How You Can Simplify Control Problems and Save Money with 'Control Centers'."

Name_____

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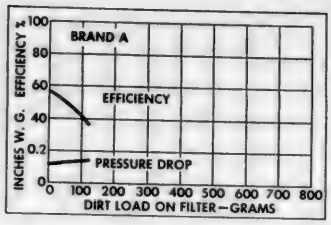
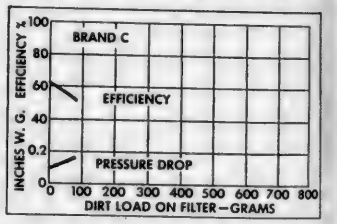
FAR-AIR announces the

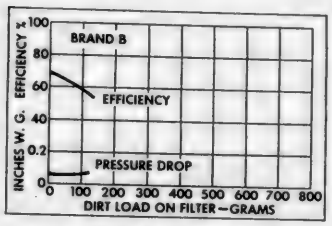
Better by FARR
Better buy FARR

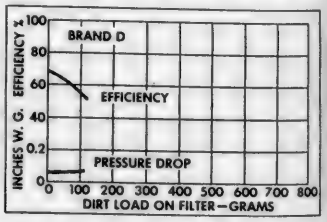
COMPARATIVE PERFORMANCE





ORDINARY 1" FILTER AT 800 CFM





ALL CURVES BASED ON 20x20x1" FILTERS

first high velocity 1" filter

HOLDS 7 TIMES AS MUCH DIRT AS OTHER 1" FILTERS

Filters half-again as much clean air because of 50% greater capacity
Gives sustained efficient performance with low pressure loss
Can be used at either high or low velocity

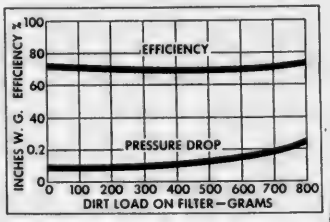
Here at last is a scientifically designed, proven, ruggedly built, all metal, high velocity 1" filter. It is no longer necessary to make extensive never-ending replacements . . . or put up with poor performance as ordinary 1" filters approach the useless point.

Based on the famous Far-Air herringbone design, this new gabled-crimp 1" filter is actually as efficient as most 2" types. Quantitative tests prove it's the best 1" filter on the market. It holds up to 800 grams of Standardized Fine Air Cleaner Test Dust before cleaning is necessary. Compare the curves—see for yourself it holds 7 times as much dirt as other brands. Far-Air 1" filters load progressively—like our 2"— and give you high efficiency air filtration without critical pressure loss right up to cleaning time. Cleaning is simple and easy. With reasonable care your Far-Air filters will last indefinitely.

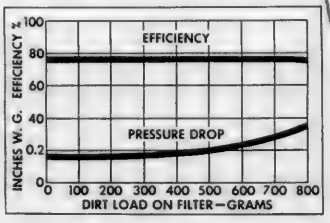
This new-type filter opens up new and exciting possibilities in many fields. Design engineers can now get higher quality performance in 1" frames. Equipment manufacturers can attain greater efficiency and economy in their products with ⅓ less space for filter units. Service organizations need make fewer calls to maintain safe, dependable air filtration for their customers.

Eliminate the wasteful expense of inefficient filters—save time and trouble—get better air filtration at lower cost. Write today for complete information. Farr Company, P. O. Box 10187, Airport Station, Los Angeles 45.

NEW FAR-AIR 1" FILTER AT 800 CFM



NEW FAR-AIR 1" FILTER AT 1200 CFM



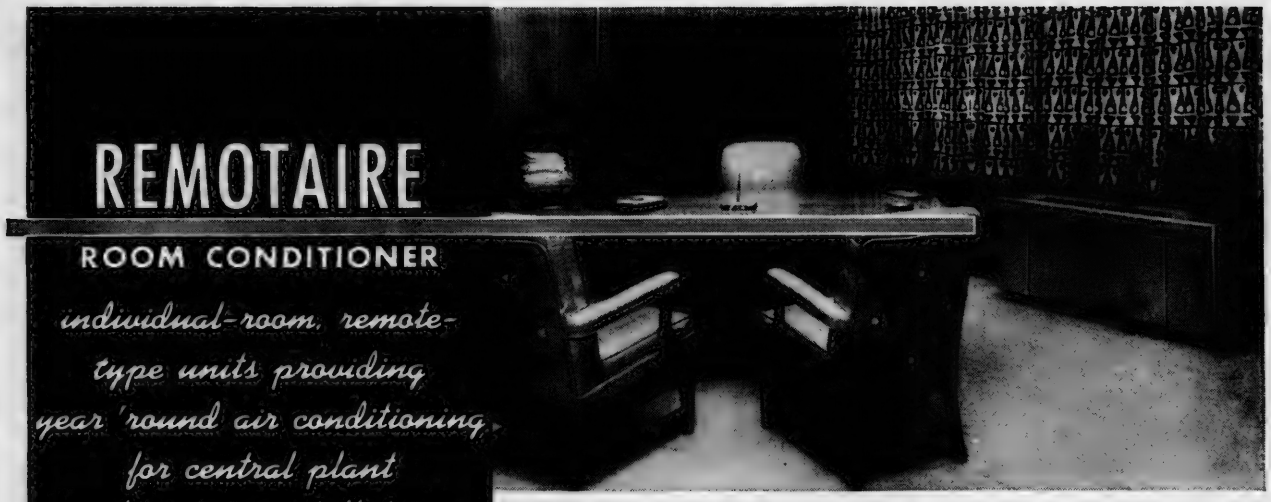
ORIGINATORS OF FAR-AIR CERTIFIED FILTER SERVICE

FARR COMPANY

NO COMPROMISE ON QUALITY

Los Angeles, New York, Chicago, Memphis

MANUFACTURED UNDER LICENSE BY FARR COMPANY MANUFACTURING LTD., MONTREAL, CANADA



REMOTAIRE

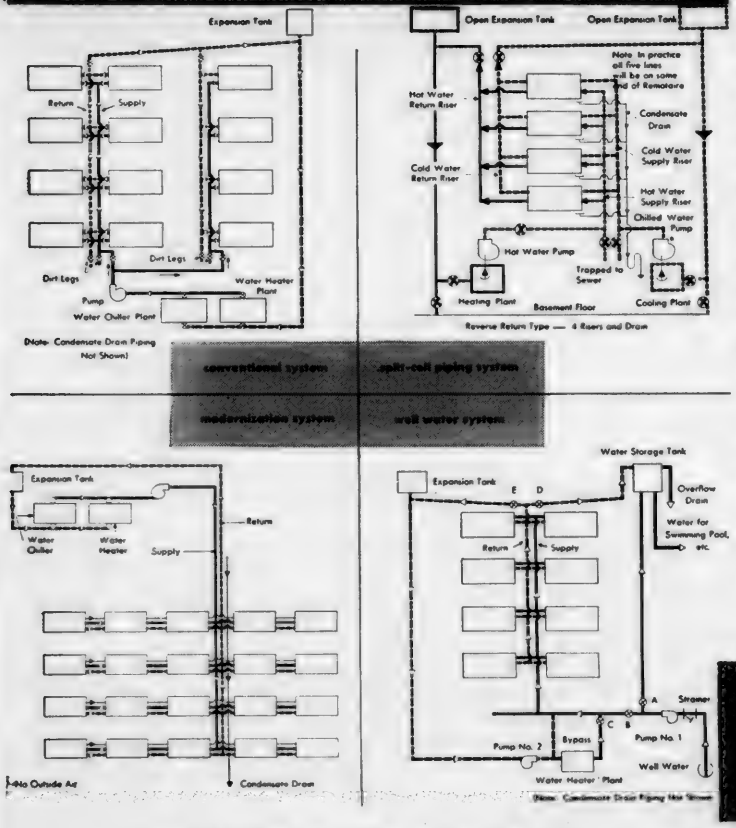
ROOM CONDITIONER

individual-room, remote-type units providing year 'round air conditioning for central plant multi-room installations

Adaptable to the one system that's most efficient, most economical for the job...

WALL APERTURE SYSTEM • INTERIOR VENTILATION SYSTEM • WELL WATER SYSTEM
SPLIT-COIL SYSTEM • MOTEL SYSTEM • RESIDENTIAL SYSTEM • MODERNIZATION SYSTEM

SOME TYPICAL PIPING ARRANGEMENTS FOR REMOTAIRE SYSTEMS:



● The Remotaire room conditioner heats in winter, cools in summer . . . filters and circulates the air all year 'round. Using chilled water from a central water chiller for summer cooling and hot water from a central heating plant for winter comfort, the Remotaire system provides clean, draft-free, healthful comfort-conditioning for multi-room installations such as hotels, motels, schools, hospitals, office buildings and residences.

A Remotaire system is versatile. It can be adapted to the system of air conditioning that is best suited to each building . . . new construction or modernization. Ventilation can be provided in a variety of ways . . . several methods of piping arrangements are possible. Since units can be installed free standing or recessed partially or completely, they afford wide flexibility in architectural planning.

As part of a Remotaire system, individual unit control permits each room occupant to choose the temperature that suits him best without affecting adjoining rooms. And when the unit is not in use it can be completely turned off, thereby reducing operating costs.

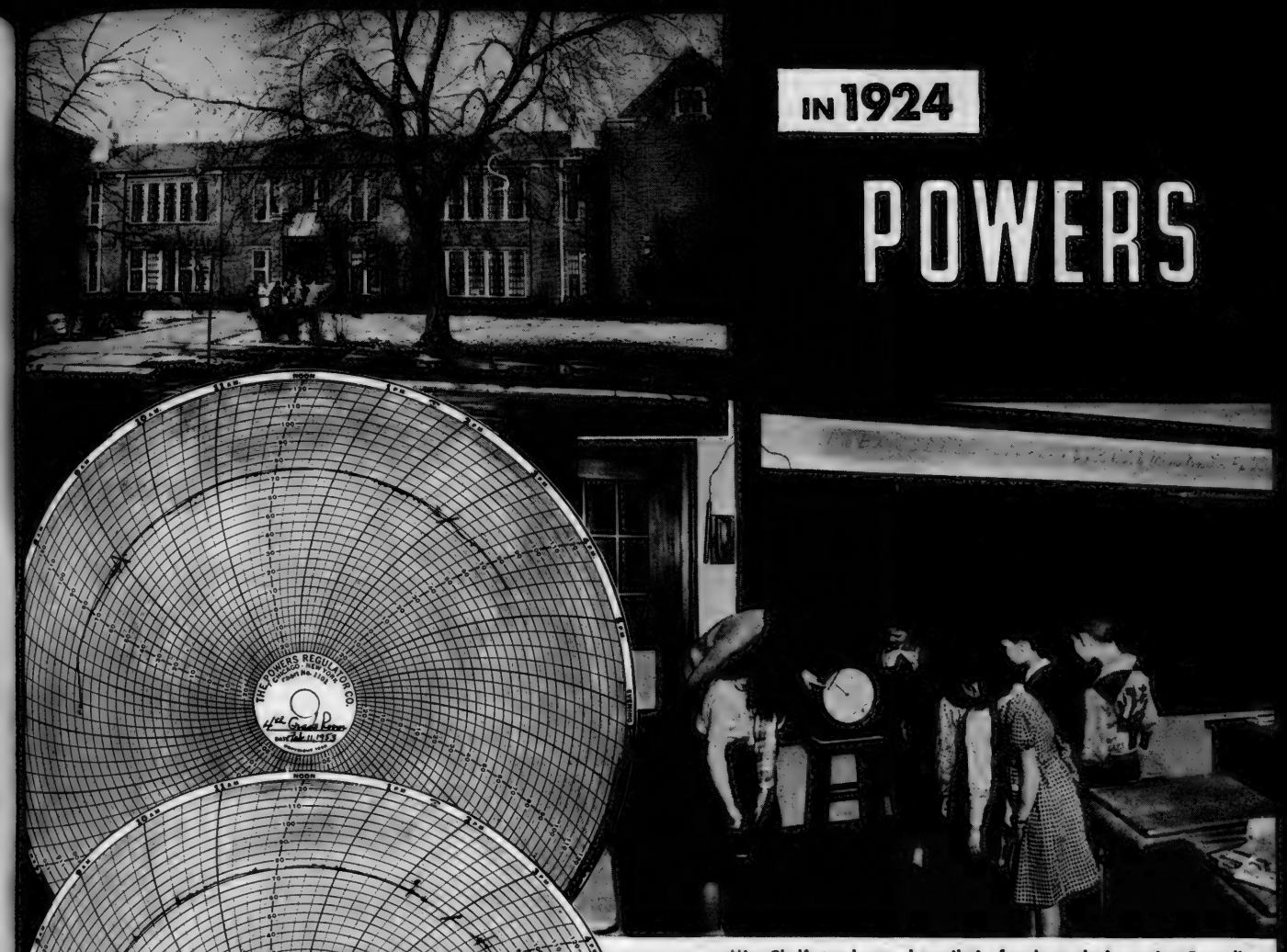
For further details on the various Remotaire systems, write for descriptive literature.

AMERICAN-Standard
HEATING-COOLING SYSTEMS

American Radiator & Standard Sanitary Corporation, Dept. HV-14, Pittsburgh 30, Pa.

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS



IN 1924

POWERS

Miss Chelf, teacher and pupils in fourth grade inspecting Recording Thermometer chart record shown at left. Powers Type K Thermostat was set for 75° F. Note even control during school hours.

After 29 Years Charts like those shown at left.

Will the Temperature Control System you are buying today give as good regulation as this when it is 29 years old?

Again and again 25 to 50 year old POWERS pneumatic systems of temperature control pass recording thermometer tests with high marks.

Why make a major investment in a control system that has no proven record for long life, low operating and low maintenance cost? Get the most for your money. Install Powers.

Maintenance cost on this job was 11% of the installed price 29 years ago.

(b45)

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS

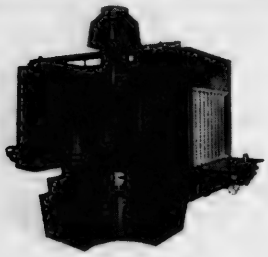
OFFICES IN OVER 50 CITIES IN U.S.A. CANADA, AND MEXICO • SEE YOUR PHONE BOOK

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

REVOLVING UNIT HEATERS

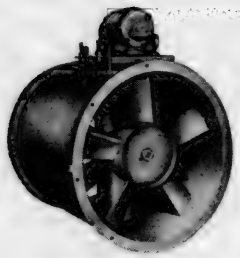
The discharge outlets revolve slowly, distributing the heated air vertically downward in a constantly changing direction. May also be used for summer ventilation.

GAS-FIRED UNIT HEATERS



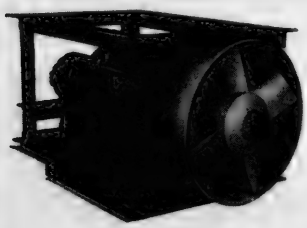
The only vertical discharge gas-fired unit heaters. Operate without steam or water on manufactured gas, natural gas or mixed gases. Stationary or revolving discharge outlets.

STRAIGHT LINE DUCT FANS



Designed to form a part of any straight run of duct. Motor is outside of casing. V-belt drive is through an air tube through casing. Fan is WINGFOIL Axial Flow Fan. Bearings are grease-sealed.

ELBOW TYPE DUCT FANS



Designed to take the place of an elbow in a duct system. Motor and drive are outside of airstream remaining cool, clean and easily accessible. Fanwheel is non-overloading WINGFOIL fan.

Wing

Since 1879, **WING equipment for heating, ventilating and combustion has been proving its worth in daily, satisfactory, trouble-free service. Today, the name WING offers unusual value for the competitive conditions confronting us in the immediate future.**

WING efficiency, reliability and economy have been proven in countless installations in every industry and under practically all conditions of service.

WING has been pioneer and leader in the fields of ventilation by axial flow fans, in factory heating by unit heaters, in forced and induced draft, both motor and turbine driven, and in auxiliary steam turbines.

The name WING on the equipment you specify is a guarantee of economy and satisfactory performance.

L. J. Wing Mfg. Co.

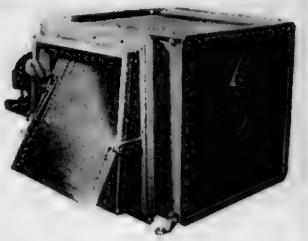
158 Vreeland Mills Road • Linden, N. J.

Factories: Linden, N. J. and Montreal, Can.

European representative for heaters:
WANSON, Haren Nord, Brussels, Belgium

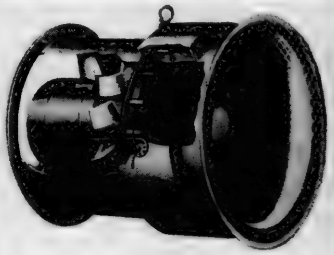
WING

DRAFT INDUCERS



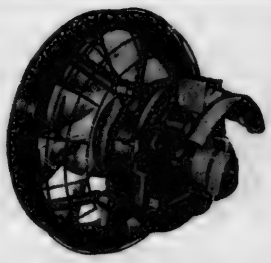
Assure positive draft at all times, regardless of weather conditions. Fan and bearing assembly easily withdrawn for servicing. No alignment required. No lubrication needed. Wide capacity range.

MOTOR-DRIVEN BLOWERS



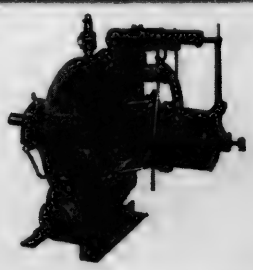
For oil or gas burners, stokers, pulverized fuel and hand-fired boilers. For statics up to 10 in. Volumes up to 50,000 CFM. Manual or automatic capacity variation. Static efficiencies up to 80%.

TURBINE-DRIVEN BLOWERS



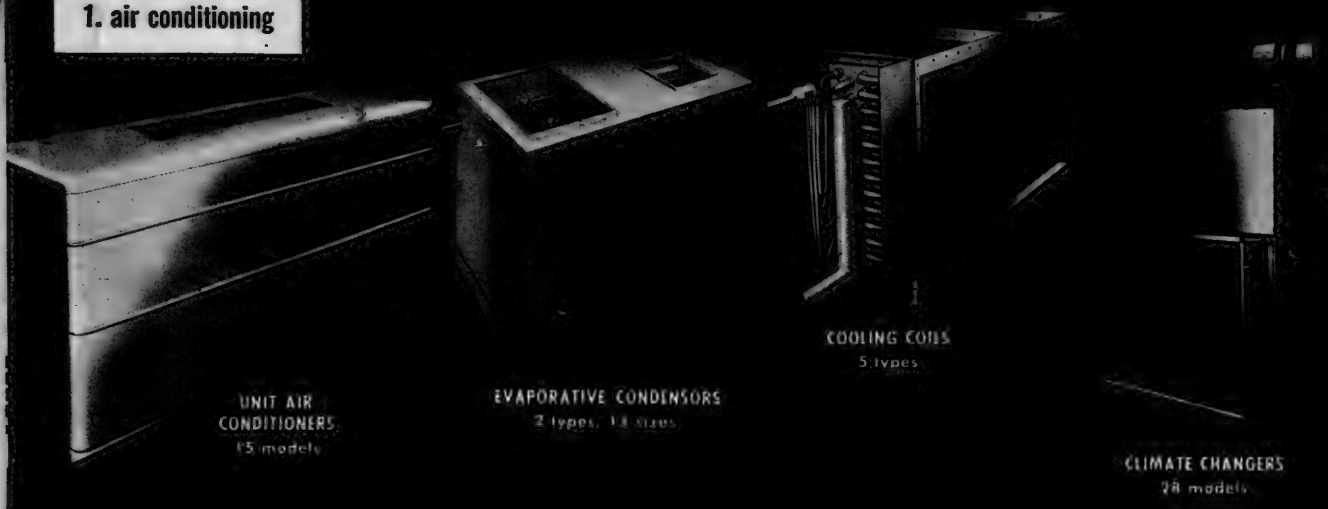
Easily installed on burner fronts of boiler settings, eliminating duct work providing precise draft control, manually or automatically. Negligible operating cost.

STEAM TURBINES



Used for driving fans, pumps, generators stokers, etc. Horizontal or vertical shaft designs. Clock wise or counter-clockwise. To 150 HP. Temp. to 750° F. Speeds to 4000 RPM.

1. air conditioning



UNIT AIR CONDITIONERS
15 models

EVAPORATIVE CONDENSORS
2 types, 13 sizes

COOLING COILS
5 types

CLIMATE CHANGERS
28 models

2. ventilating

FANS
forward curved, backwardly inclined, utility, propeller

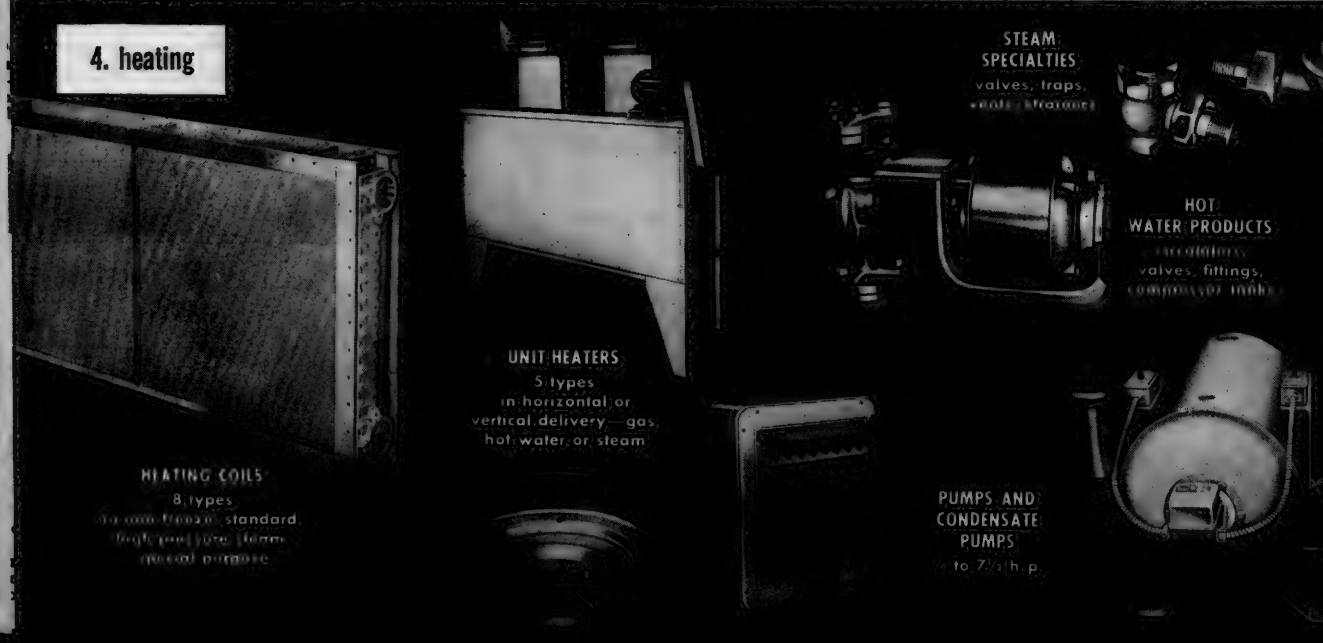
ROOF VENTILATORS
power units with or without heating coils

3. heat transfer

DRY-TYPE FLUID COOLERS
2 series—horizontal or vertical air stream

BRAZED ALUMINUM HEAT EXCHANGERS
complete range of core sizes and surfaces

4. heating



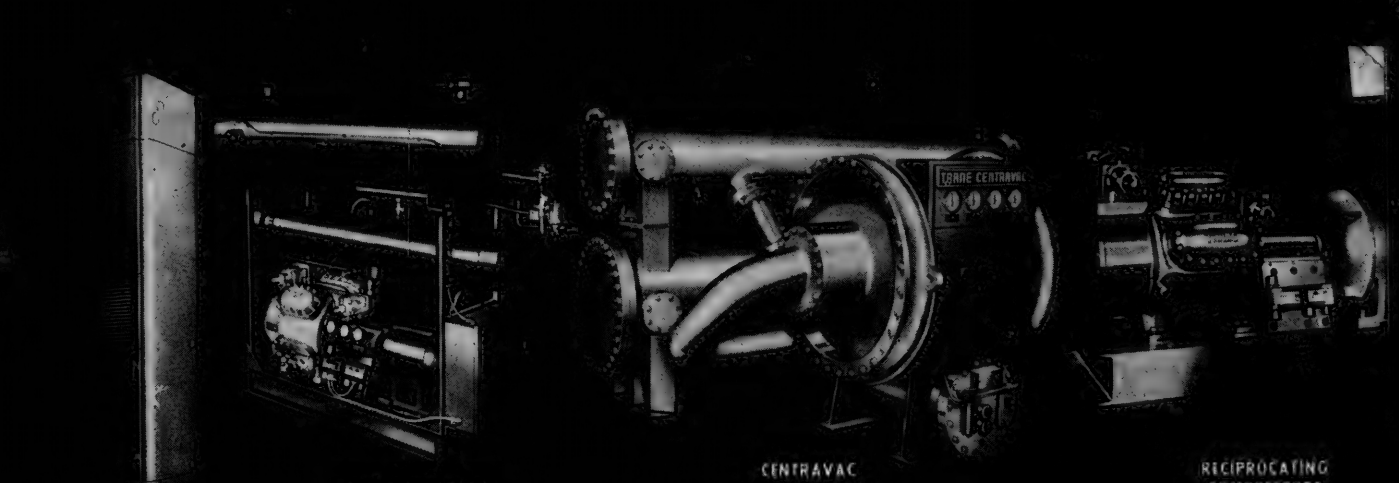
HEATING COILS
8 types
for non-freeze, standard, high pressure, low, steam, special purpose

UNIT HEATERS
5 types
in horizontal or vertical delivery—gas, hot water or steam

STEAM SPECIALTIES
valves, traps, [illegible]

HOT WATER PRODUCTS
[illegible]
valves, fittings, [illegible]

PUMPS AND CONDENSATE PUMPS
¼ to 7½ h.p.



SELF-CONTAINED AIR CONDITIONERS
3 to 20 tons

COLD GENERATORS
packaged water chillers—
10 to 100 tons

CENTRAVAC
35 to 400 ton
hermetic centrifugal
refrigeration units

RECIPROCATING COMPRESSORS
3 to 50 tons

Trane — the single source for all 4

1. Air Conditioning 2. Ventilating 3. Heat Transfer 4. Heating

The success of your job is assured in two big ways when you make it a TRANE job *all the way* . . . whether it's air conditioning, heating, ventilating or heat transfer.

First, you are getting products that are designed and built for service together. They're matched. Consequently, they're bound to serve you better.

Secondly, you're concentrating the responsibility with *one* manufacturer . . . not dividing the responsibility among many.

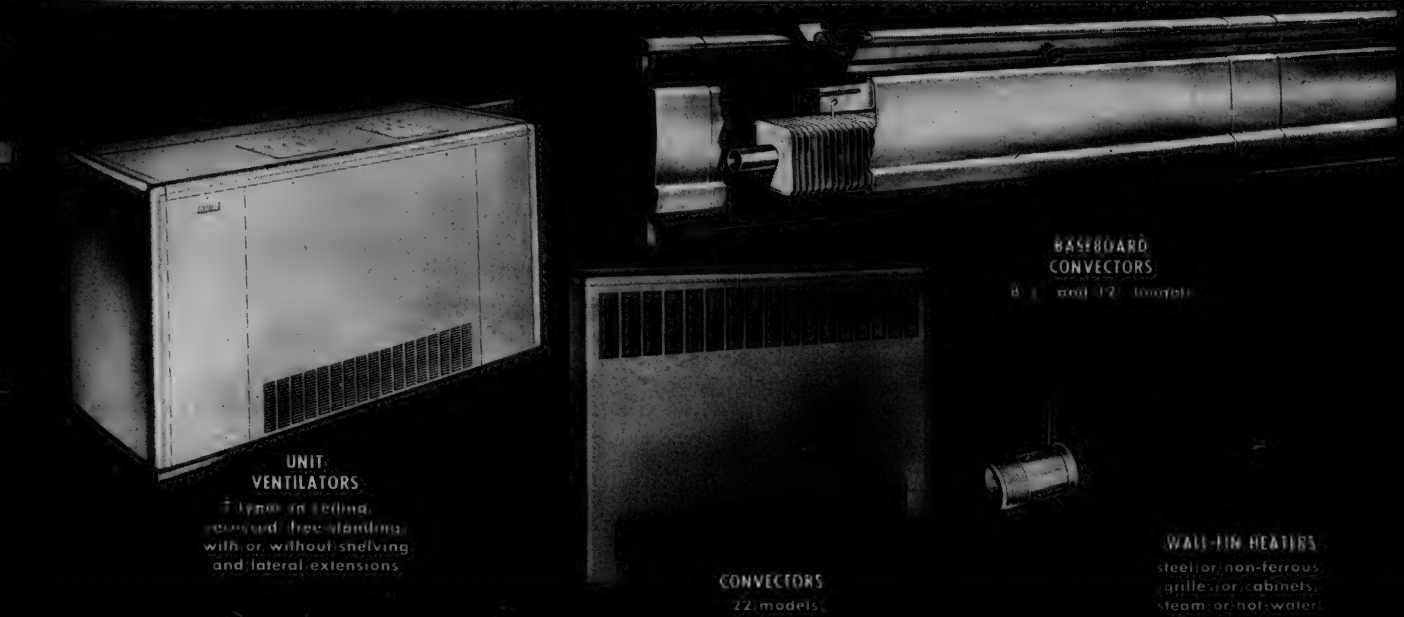
Only TRANE offers you matched products in *all four* fields—1) air conditioning, 2) ventilating, 3) heat transfer, 4) heating.

For complete data on any or all of the TRANE lines illustrated on these pages, contact your nearest TRANE sales office or write TRANE, La Crosse, Wisconsin.

one source . . . one responsibility **TRANE**

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton, Penn. • Trane Co. of Canada Ltd., Toronto • 87 U.S. and 14 Canadian Offices.



UNIT VENTILATORS
7 types on ceiling,
recessed, free-standing,
with or without shelving
and lateral extensions

CONVECTORS
22 models

BASEBOARD CONVECTORS
8', 10' and 12' lengths

WALL-FIN HEATERS
steel or non-ferrous
grilles or cabinets
steam or hot water

PAUL THIRY'S *daring, functional design called for modern*

SARCOTHERM HEATING CONTROLS

Architect: **Paul Thiry**
Engineers: **The Austin Company**
Heating Contractors: **L. G. Massart Plumbing & Heating Co.**

CHURCH OF CHRIST THE KING, SEATTLE, WASH. Semi-circular arrangement seats 550 persons with no pew more than 50 feet from altar. Other features: 60-foot carillon tower; covered portico, stained glass clerestory.

TAKE ADVANTAGE OF SARCOTHERM'S UNUSUAL ENGINEERING SERVICE

In A Class By Itself—Sarcotherm's engineering service begins with the inception of the job, *carries through* every step of the way.

Complete Installation Drawings And Wiring Diagrams—not just general drawings but complete, tailor-made drawings and diagrams for each individual job.

On The Job Help—your contractor gets full cooperation and technical assistance backed by many years of specialized experience.

ARCHITECT PAUL THIRY'S inspiring design for Church of Christ The King is completely functional from its 60-foot carillon tower down to its weather modulated controls.

Radiant heating and the large attendance expected necessitated an extremely accurate, sensitive control system. To do the job, design engineers specified a Sarcotherm Weather Compensated Control System which insures comfort conditions inside regardless of outside temperatures.

Sarcotherm advantages of simple, low-cost, accurate control plus unique engineering service can help you design and install the most efficient system possible. A Sarcotherm engineer will be happy to advise you on your next project.

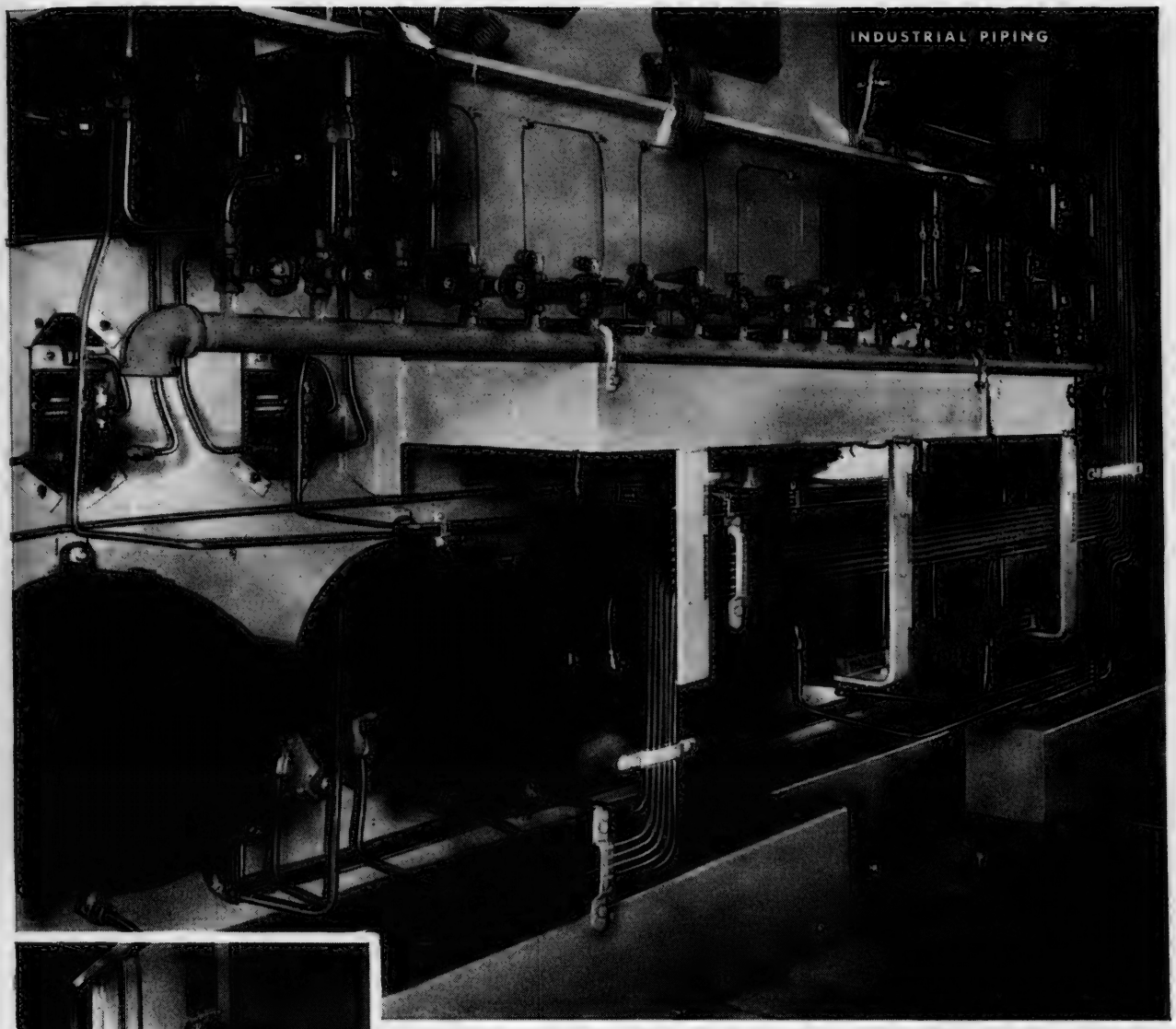
For full information on Sarcotherm controls, write for complete catalog.

SARCOTHERM CONTROLS, Inc.

Empire State Bldg., New York 1, N.Y.

An Affiliate of SARCO COMPANY, INC.

Weather Modulated Controls for **HOT WATER, RADIANT AND STEAM** *Heating Systems*



THESE AIR SIGNAL LINES in Toronto's Richard L. Hearn Power Station use copper tube in long lengths, change direction and avoid obstructions without fittings.

MOIST COMPRESSOR AIR can never form rust or scale to impede control in this installation made by Bailey Meter Co., Ltd.

Wet air can't rust this copper control piping

CONTROL would be impaired if moisture could create rust or scale in these pneumatic control lines for coal-pulverizing equipment installed by Bailey Meter Company, Limited, in Toronto's Richard L. Hearn Power Station. A number of these copper tubes convey differential pressures to the pulverizer feeder controllers, while others transmit an air signal to the pulverizers to selectively limit the rate of coal feed. Rust particles which might interfere with the satisfactory operation of the control system cannot form, and the smooth bore keeps flow resistance at a minimum.

Here, as in all copper tube systems, the long lengths, the light weight and the elimination of many fittings by bending all make important savings in installation costs. Where flare or solder-type fittings are used, there are no threads to cut, and connections stay tight.

Publication C-24 offers many additional facts on how ANACONDA Copper Tubes can help improve product quality, reduce operating and maintenance costs and avoid costly shutdowns. Write to: *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* 5330

call your

ANACONDA®

distributor for

Copper tubes and fittings for industrial process lines, water, heating and sanitary drainage systems; American Flexible Metal Hose and Tubing; American Vibration Eliminators.

Marlo Helps to Cool Ford's Giant "Birthday Cake".....

Assoc. Engineers & Architects:
Lucomer-Manser & H. Sanborn Brown, Detroit

General Contractors:
Walter L. Couse & Co., Detroit

Mechanical & Electrical Engineers:
Clarence L. Toonder & Associates, Detroit

Air Conditioning & Refrigeration Contractors:
Detroit Ice Machine Co.

Industrial Piping:
Page Plumbing & Heating Co., River Rouge

The newly-reopened Ford Rotunda at Dearborn, Mich., towers into the sky like a giant's birthday cake from some fantastic fairy tale, its top ablaze with 50 candles to mark the Golden Jubilee of the Ford Motor Company.

Thanks to the magic of modern air conditioning, the thousands of daily visitors who view the many interesting exhibits in this massive windowless structure enjoy complete comfort—a comfort that Marlo is proud to have a part in providing.

Two huge Marlo 100-ton cooling towers, concealed on the roof behind the fluted columns, play an important role in the air conditioning system which keeps this fabulous "birthday cake" cool and comfortable even in the hottest of summers.

Marlo Cooling Towers are designed to save up to 95% of normal water demand . . . to operate quietly and unobtrusively . . . to give long service with minimum maintenance. Available for indoor or outdoor location, they range in capacity from 20 tons to 100 tons or more. For residential and light commercial use, Marlo produces the new 2-16-ton "Thrifti-Tower."

WRITE to Marlo today for complete information on efficient, economical cooling towers for every application.

Marlo COIL COMPANY

Manufacturers of COOLING TOWERS • EVAPORATIVE CONDENSERS • INDUSTRIAL COOLERS • AIR CONDITIONING UNITS • MULTI-ZONE UNITS • BLAST HEATING & COOLING COILS

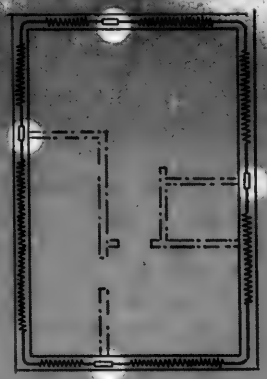
Saint Louis 10, Missouri

ANNOUNCING...

a practical, economical answer to expansion control in heating systems

The FLEXON EXPANSION COMPENSATOR

HERE'S HOW TO USE IT



Use a Flexon Expansion Compensator in each straight run of piping and tubing, baseboard radiation systems and finned convector systems, etc.

Now you can have a scientifically engineered expansion compensator that is especially designed to absorb thermal expansion in steam or hot water heating system lines. Designed and manufactured by Flexonics Corporation, a leading fabricator of heavy-duty expansion joints for industrial piping, the Flexon Expansion Compensator is backed by over 52 years manufacturing experience.

The Flexon Expansion Compensator consists of a two ply phosphor bronze bellows with copper tube end connections, enclosed in a floating protective shroud of brass. All joints are electronically sealed with silver solder for long leak-proof life. There is no packing to replace, no maintenance whatsoever. Just install the units as easily as any fitting and then forget them. Flexonics Expansion Compensators are designed to outlast the building. Long cycle life is proved by extensive testing under installation conditions. The cost is moderate and puts an end to leakage and to pipe creeping noises caused by uncontrolled expansion.

Flexon Expansion Compensators are made in ¾", 1", 1¼" and 2" sizes for use in hot water or low pressure steam systems. Contact your local distributor for further information or use the coupon below for your copy of a descriptive bulletin.

Flexonics *Corporation*

Flexon identifies products of Flexonics Corporation that have served industry for over 52 years.

EXPANSION JOINT DIVISION
1326 S. Third Avenue
Maywood, Illinois

FLEXONICS CORPORATION HV
Maywood, Illinois

Please send me the bulletin which describes the Flexon Expansion Compensator.

Name_____

Company_____

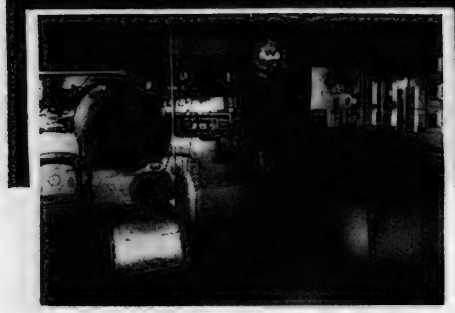
Address_____

City_____ Zone____ State_____

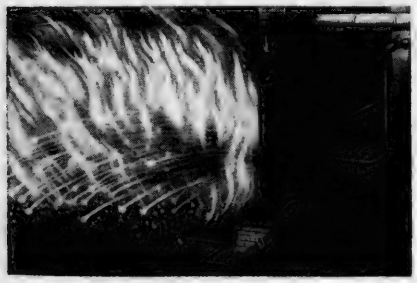
Iron Fireman

Dual or Triple Fuel Firing

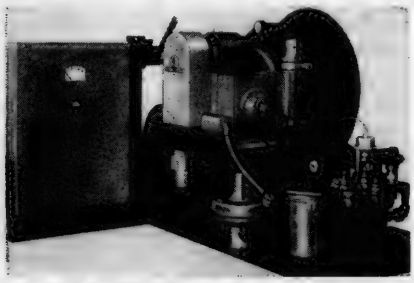
uses OIL, GAS or COAL



With this Iron Fireman installation the Hyde Park Laundry is able to burn coal, oil or gas at any time desired. Steady steam supply is required for both heating and processing.



GAS, OIL, COAL. Equipment includes Ring Type gas burner, Rotary oil burner, and Pneumatic Spreader coal stoker. Coal is automatically dried, preheated and conveyed from bunker to boiler. No manual handling; no costly conveying equipment.



GAS-OIL PACKAGE UNIT. For Scotch marine and other types of boilers. Has integral forced draft and control panel which is completely wired and tested at factory.

GAS-OIL BURNER. Ring Type gas burner and Rotary oil burner on single mounting. Fuels can be shifted quickly, with no loss of efficiency.

Fuel switch saves $510 in two months . . .

Hyde Park Laundry, Chicago, cuts costs by quick changeover

"Our past experience with our Iron Fireman stoker led us to investigate your gas and oil units along with several other makes," writes Mr. Morris Tabas, Manager of the Hyde Park Laundry. "Now we have Iron Fireman three-fuel operation—coal, gas and oil. With quick changeovers we needn't fear shortages, strikes, or what have you.

"During a two-months' period when we took advantage of seasonal gas rates, our fuel cost was $690 as compared to $1,200 with other fuels for a like period and load."

Burns all fuels efficiently

Efficiency ratings are high with oil, gas or coal. As price advantage shifts from one fuel to another your steam plant can shift with it—for the long pull if necessary. Or you can change fuels every day when desirable. This is routine practice in many companies where the gas supply is reduced during peak periods.

Avoid costly shut-downs

Fuel emergencies, due to interrupted or short supply, can be disastrous. Yet protection may cost little or nothing when offset by the fuel and labor savings of Iron Fireman multiple fuel firing.

For further information write Iron Fireman Mfg. Co., 3076 West 106th Street, Cleveland 11, Ohio.

Iron Fireman

AUTOMATIC FIRING

FOR HEATING, PROCESSING, POWER

JENKINS PRACTICAL PIPING LAYOUTS 70

How to plan an INDUSTRIAL WASTE TREATMENT SYSTEM

In many areas, stringent codes have been drawn up to regulate the types and condition of waste which may be discharged into streams and rivers, in order to conserve existing water supply sources.

Industrial discharges usually require chemical treatment, and one of the most common problems encountered is the neutralization of acid waste. In the system shown here, lime is used as the neutralizing agent. The waste normally flows to a digester which allows for settlement of solids and serves as a storage center. Flow from the digester to the treatment tank is regulated by a liquid level controller.

The treatment tank is equipped with an agitator which mixes the waste with the lime slurry to provide a neutral solution. The proportion of lime to be added is determined by a recording pH regulator, which operates the control valve on the slurry line and admits the required amount of slurry for neutralization. The slurry is made by admitting quicklime and water to the lime slurry mixer, which is equipped with an agitator. Emergency lines for direct discharge bypassing the treatment system are indicated in the diagram.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

Diagram by Huxley Madeheim, Consulting Engineer

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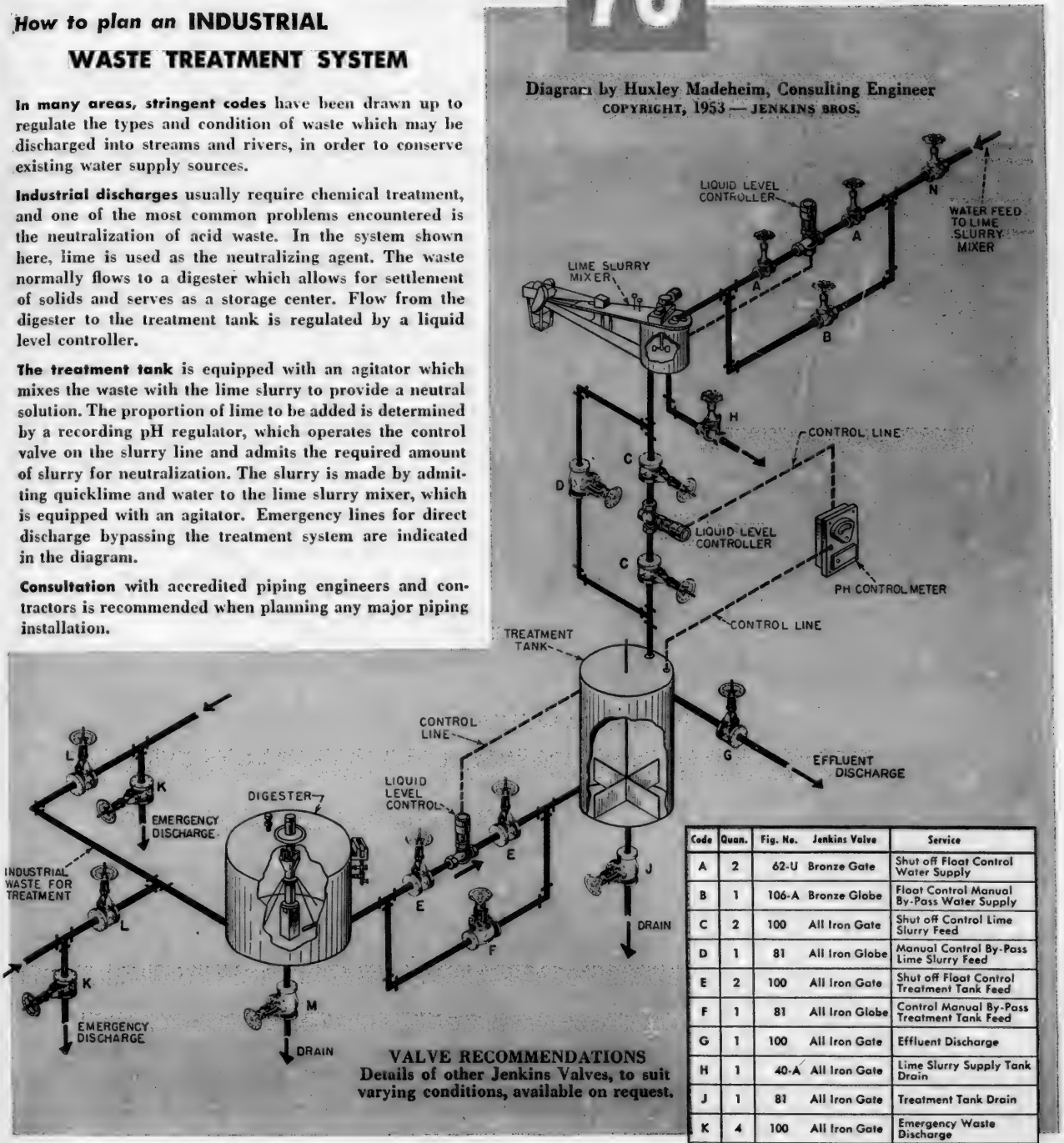


VALVE RECOMMENDATIONS
Details of other Jenkins Valves, to suit varying conditions, available on request.

Code	Quan.	Fig. No.	Jenkins Valve	Service
A	2	62-U	Bronze Gate	Shut off Float Control Water Supply
B	1	106-A	Bronze Globe	Float Control Manual By-Pass Water Supply
C	2	100	All Iron Gate	Shut off Control Lime Slurry Feed
D	1	81	All Iron Globe	Manual Control By-Pass Lime Slurry Feed
E	2	100	All Iron Gate	Shut off Float Control Treatment Tank Feed
F	1	81	All Iron Globe	Control Manual By-Pass Treatment Tank Feed
G	1	100	All Iron Gate	Effluent Discharge
H	1	40-A	All Iron Gate	Lime Slurry Supply Tank Drain
J	1	81	All Iron Gate	Treatment Tank Drain
K	4	100	All Iron Gate	Emergency Waste Discharge
L	4	100	All Iron Gate	Shut off Waste Lines
M	1	81	All Iron Globe	Digester Drain

To simplify planning, to save time, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

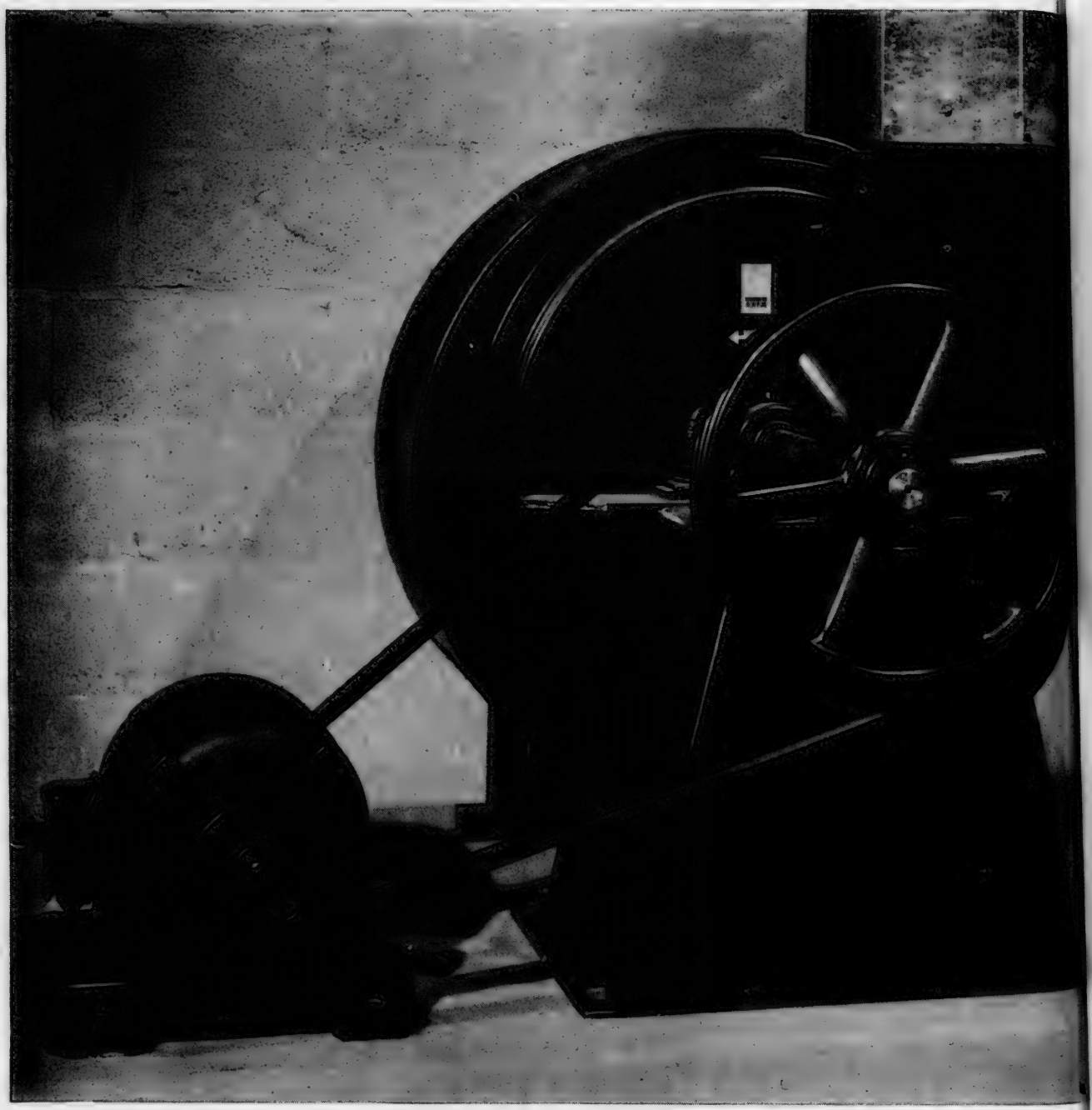
Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 70.

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
SINCE 1864

Jenkins Bros.

Complete
With 3 Extra



ALLIS-

Service

Allis-Chalmers Benefits

Put the Allis-Chalmers control-motor-drive combination on your air conditioning job and you'll benefit three ways:

Engineering Help

1 The local Allis-Chalmers district representative or distributor will engineer the complete control-motor-drive for you . . . you'll save *hours* and *dollars* of engineering time!

Coordinated Equipment

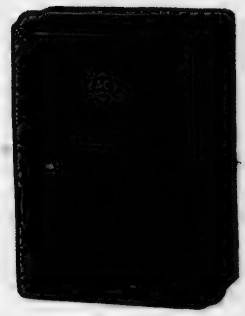
2 You don't have the problem of coordinating three sources of supply . . . A-C components are designed and built to work together smoothly and efficiently!

Guaranteed Performance

3 You get the benefit of one responsibility for equipment service and performance. The complete Allis-Chalmers control-motor-drive combination is *guaranteed* to perform as a unit. Nation-wide service is readily available.

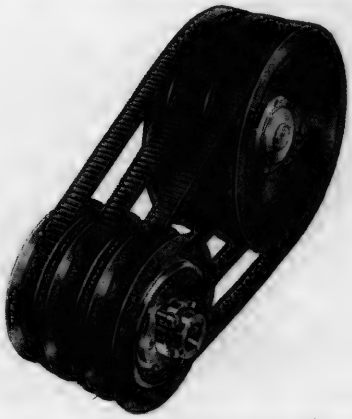
Get Allis-Chalmers control-motor-drive combination on your next job . . . get these three benefits for a smoother, money-saving installation.

A-4208



CONTROL

MOTOR



Texrope DRIVE

Ample

NATION-WIDE STOCKS

A wide selection of control-motor-drive equipment used in the air conditioning industry is maintained by Allis-Chalmers district offices and authorized distributors. In addition, an efficient warehouse inventory system locates seldom-called-for items within hours after you call. For immediate action specify Allis-Chalmers equipment.

Nation-Wide

CERTIFIED SERVICE

With A-C equipment, there's always service near. Allis-Chalmers Certified Service Shops are independently owned... meet the high A-C standards for modern equipment, efficient methods, and business integrity. These shops assure your customers factory approved parts, equipment, and fast efficient service.

Send for FREE Engineering Literature

Allis-Chalmers, Milwaukee 1, Wisconsin

MOTORS

- ☐ Handy Guide to Motor Selection — 51B6052
- ☐ Squirrel-Cage Motors — 51B6210

CONTROL

- ☐ Handy Guide to Starters — 14B7733
- ☐ Reduced Voltage Starters — 14B7215

***TEXROPE* DRIVES**

- ☐ Handy Guide to *Texrope* Drives — 20B6051
- ☐ *Vari-Pitch* Drive Engineering Data — 20B7499

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

CHALMERS

A-C ALLIS-CHALMERS

COPELAMETIC

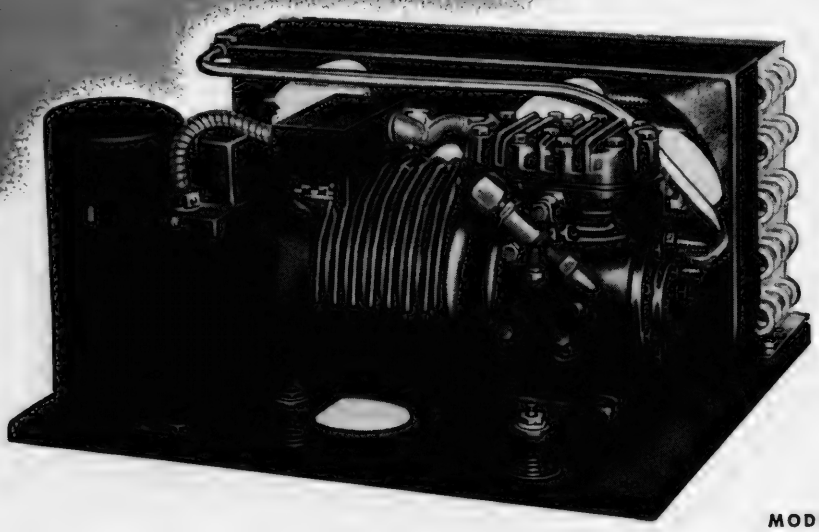
THE *Accessible* HERMETIC

compact . . . dependable . . . quiet . . .

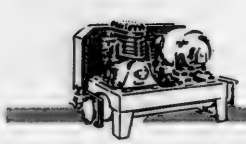
Compact . . . dependable . . . quiet. Those are the prime requirements for the refrigeration unit in any air conditioning system. Add to them ruggedness, accessibility and long life and you have the COPELAMETIC.

For the unit that has everything, look to Copeland the pioneer. Practical-minded engineers designed this modern unit without belts, seals or manual oiling, and to top that they made it accessible for servicing on the spot. Specify COPELAMETIC and be sure of a satisfied client for years to come.

There's a Copeland unit for every type air conditioning installation from smallest to largest. Air-cooled, remote COPELAMETICS are made from 1/4 thru 3 HP. There are water-cooled, remote units from 1/3 thru 7-1/2 HP. Self-contained COPELAMETICS are available for all applications. For complete details, write us or call your refrigeration dealer.



MODEL DE-100 ILLUSTRATED



REFRIGERATION UNITS (OPEN-TYPE AND COPELAMETIC) WATER COOLERS

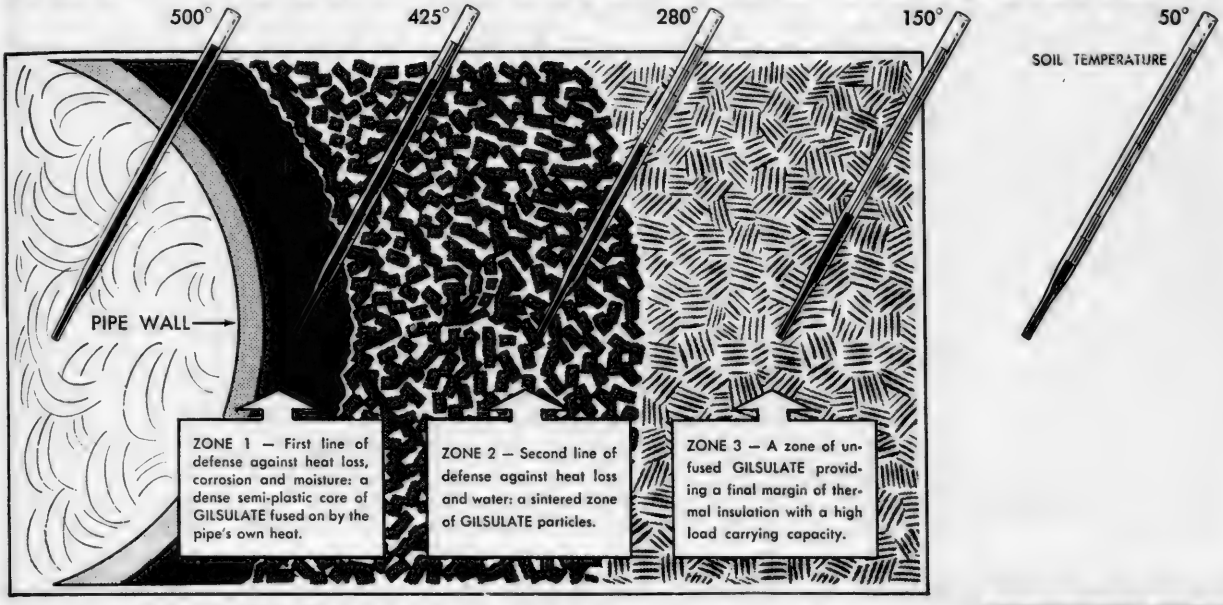
Copeland

DEPENDABLE *Electric* REFRIGERATION

COPELAND REFRIGERATION CORPORATION • SIDNEY, OHIO

Lowest Cost

PER INSTALLED LINEAR FOOT OF ANY HOT UNDERGROUND PIPE INSULATION


500°
425°
280°
150°
50°
SOIL TEMPERATURE
PIPE WALL
ZONE 1 — First line of defense against heat loss, corrosion and moisture: a dense semi-plastic core of GILSULATE fused on by the pipe's own heat.
ZONE 2 — Second line of defense against heat loss and water: a sintered zone of GILSULATE particles.
ZONE 3 — A zone of unfused GILSULATE providing a final margin of thermal insulation with a high load carrying capacity.

GILSULATE®... the triple-zone insulation that fuses itself into lifetime protection for hot underground pipes. Water-proof, corrosion-proof, root-proof, acid/alkali-proof.

Compare your present insulation methods with Gilsulation:

1. Pour Gilsulate granules out of the bag onto the pipe; tamp it down.
2. Backfill: *the job is insulated!*

Gilsulate—nature's own insulation—is a unique, solidified hydrocarbon that virtually installs itself. Normal pipe-heat (up to 520°F) does the rest—fuses the Gilsulate to the pipe in hours, forming a massive circular solidified sheath.

Gilsulate costs less installed per linear foot *than any other underground pipe insulation*... it's easiest to use... and has been tested in scores of the country's largest and most important installations.

Some additional Gilsulate advantages:

- *3 grades available*—220° to 520° F
- *needs no sleeves* or mechanical sheaths
- *requires no mixing* or special handling
- *can't be punctured* — leave rocks in backfill
- *pipe expands and contracts* within Gilsulate structure
- *proved in actual use* in hundreds of new construction and replacement installations

Send coupon for descriptive literature.

AMERICAN GILSONITE COMPANY
SALT LAKE CITY, UTAH
Affiliate of Barber Oil Corp. & Standard Oil Co. of California

No skills necessary—simply pour Gilsulate out of 100 pound bags, tamp and backfill. Can be used under any and all conditions—no matter how many pipes, whatever the space.

GILSULATE®

THE TRIPLE-ZONE INSULATION
FOR LIFETIME PROTECTION
OF HOT UNDERGROUND PIPES.

American Gilsonite Company
134 West Broadway, Salt Lake City 1, Utah
or 1145 East Jersey Street, Elizabeth 4, N. J.

Please send me descriptive literature on Gilsulate.

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

WITH McQuay YEAR-ROUND AIR CONDITIONING

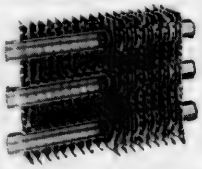
PROVED AND PREFERRED...a complete line!

You're assured of comfort in any season when you install McQuay year-round air conditioning. McQuay products are proved and preferred—for their efficiency, economy of operation, and the way they stand up under long hard use.

Join the growing list of architects, engineers, and contractors who depend upon McQuay to satisfy all of their heating and air conditioning requirements.

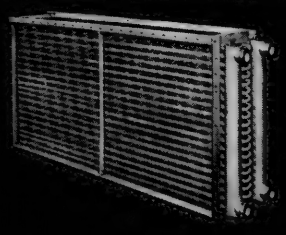
Consult the McQuay representative in your territory or write McQuay Inc., 1619 Broadway St. N.E., Minneapolis, Minnesota.

FAMOUS RIPPLE-FIN CONSTRUCTION

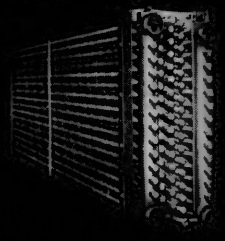


Ripple-fin coil construction is the product of years of research aimed at producing the ultimate in heat transfer for any weight metal. High efficiency is assured by forcing the air to follow an ever-changing direction of flow in passing through the coil. Thus the air repeatedly contacts coil surface to give maximum contact time, maximum contact velocity and a resultant optimum heat transfer. The staggered tube and rippled edge features, so well known to the industry, contribute greatly to higher heat transfer, construction ruggedness and eye appeal.

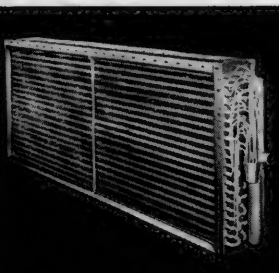
AIR CONDITIONING COILS



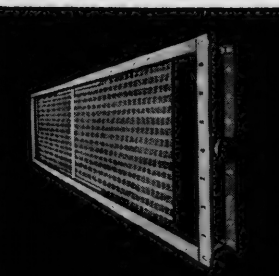
For Cooling and Heating. 1 to 10 rows deep.



Removable Plug Type, 1 to 10 rows deep.



For Cooling. 1 to 8 rows deep.



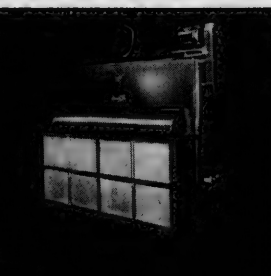
In 1 or 2 rows deep, using low or high pressure steam.

AIR CONDITIONING UNITS

Also available in basic or ceiling types, 3 sizes 200 cfm 400 cfm and 600 cfm.

4 sizes 2 to 10 Ton Models For use with hot or cold water, steam or direct expansion.

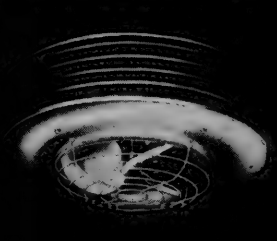
Type "AC" Central Station Air Conditioners in 14 sizes for industrial and commercial applications



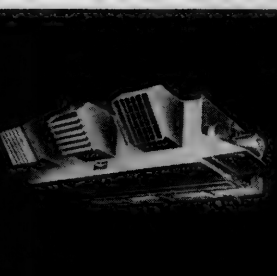
Type "AC" Central Station Air Conditioners in 14 sizes for industrial and commercial applications.

UNIT HEATERS

24 sizes with Nominal Capacity range 20,300 to 360,000 Btu's



22 sizes with Nominal Capacities from 25,400 to 500,000 Btu's.



20 sizes with Nominal Capacities from 20,600 to 1,600,000 Btu's.

20 sizes with Nominal Capacities from 20,600 to 1,600,000 Btu's.

McQuay INC.

1619 BROADWAY ST. N. E., MINNEAPOLIS, MINNESOTA

HEATING
AIR CONDITIONING
REFRIGERATION

"Daddy's stuck, mommy"

It happens so often at the end of a wintry day. Your car has carried you faithfully, from one business call to another, over streets and roads passable by public snow removal equipment.

Then dead-tired at nightfall, and within sight of your family and the warmth of your fireside, you get stuck in your *own driveway!*

To be "snowbound" fifty feet from home is an exasperation many of us have shared . . . but a totally unnecessary one. Modern driveway and sidewalk snow melting systems prevent it and should be as much a part of the modern American scene as the integral garage or the automobile itself. Amortized over the lifespan of the home and financed as part of the mortgage, or later as part of an improvement loan, the cost per year is negligible compared with the safety, convenience, increased property value, and collateral benefits derived.

Reliable *steel pipe,* proved in over 60 years of hot water and steam heating, is the most widely used heat transmission medium for snow removal systems. For steel pipe is economical, durable, readily formable and weldable for coils and grids, and is "familiar" to plumbers and pipe fitters everywhere.

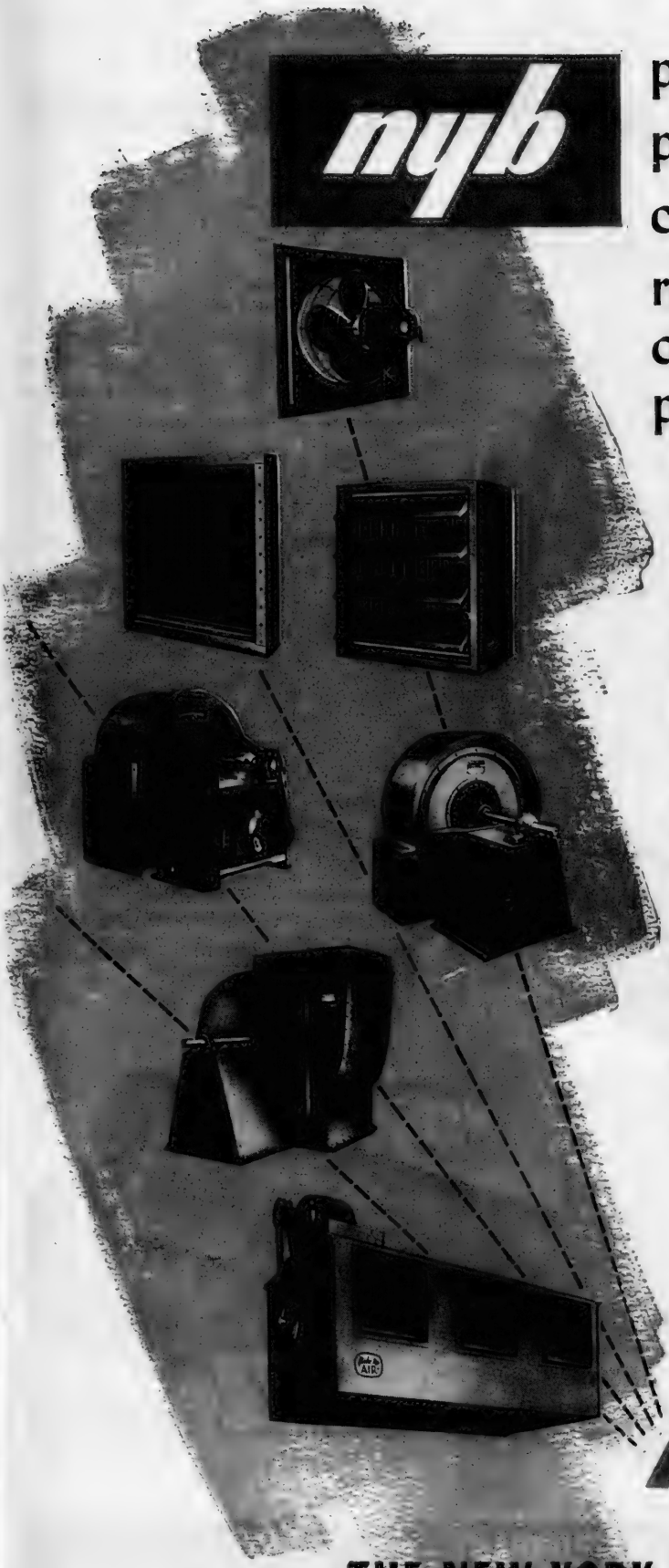
Public interest in "domestic" sidewalk and driveway snow melting is high, due to the dramatic success of commercial installations seen in metropolitan areas. A *new* 32 page color booklet, "Steel Pipe Snow Melting and Ice Removal Systems", will help you capitalize on this interest and is available without charge or obligation. Write

Steel Pipe is First Choice

COMMITTEE ON STEEL PIPE RESEARCH

AMERICAN IRON AND STEEL INSTITUTE

350 Fifth Avenue, New York 1, N.Y.



perfected engineering precision manufacture certified ratings responsible guarantees of dependable performance

Wherever air is handled mechanically, whether for ventilation, heating or process, the name New York Blower enjoys an enviable reputation. ***nyb*** on a product means that the engineering knowledge acquired through over sixty years of manufacturing experience and development is built into it.

Are you using AIR to the best advantage in your production methods to cut costs, increase efficiency, reduce absenteeism, safeguard health, bring comfort to workers . . . or applying it to process control for precision manufacture and more uniform products?

When working on your air handling problems, consult the ***nyb*** representative nearest you in our nationwide service.

●

Write for Bulletins

FANS • BLOWERS • UNIT HEATERS • MAKE-UP AIR UNITS • HEAVY DUTY HEAT SURFACE

nyb

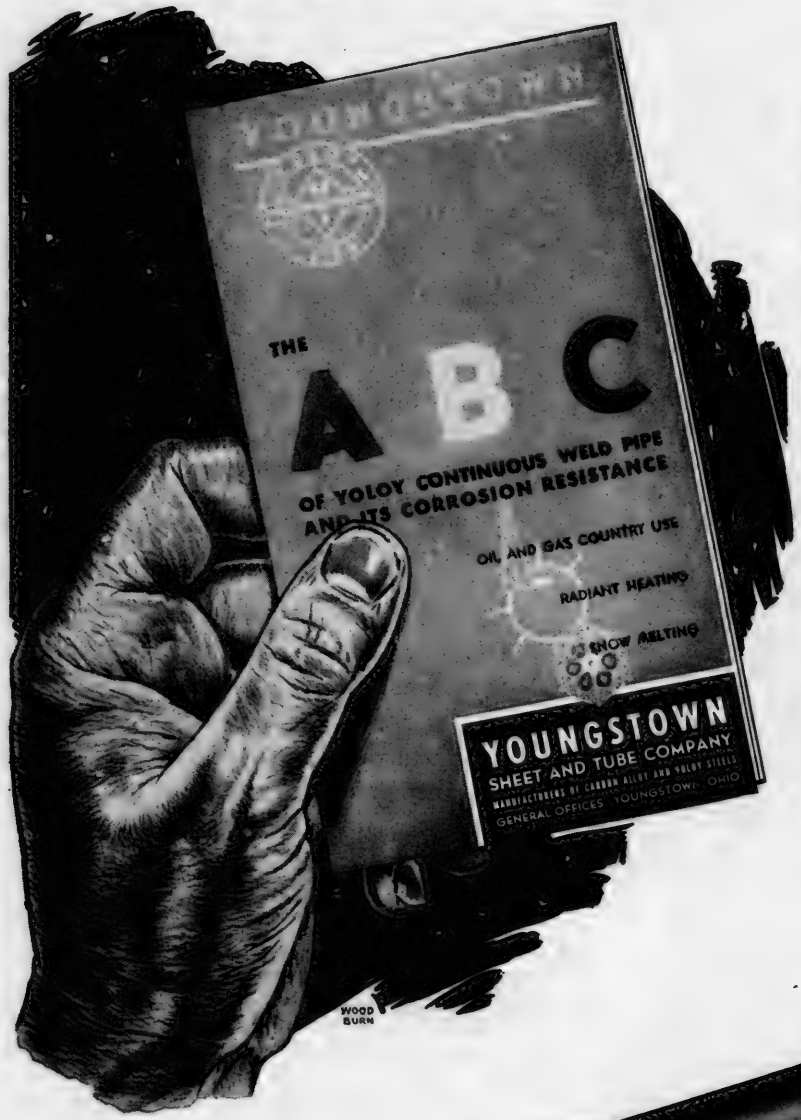
SEE OUR CATALOG IN SWEET'S

THE NEW YORK BLOWER COMPANY

SALES OFFICES • 32nd STREET and SHIELDS AVENUE • CHICAGO 16

FACTORY, LAPORTE, INDIANA

This DATA may solve YOUR piping problem



● Here is the up-to-date story of Yoloy Continuous Weld Pipe—a remarkable low alloy steel whose nickel-copper content gives it unique ability to withstand corrosion, abrasion and shock. These outstanding advantages combined with high strength, ductility and weldability make Yoloy Pipe an excellent selection.

Proved by 18 years of satisfactory performance, Yoloy is highly recommended by users in such service as radiant heating, snow melting, gas line gathering, brine lines and other industrial piping.

This new folder presents the facts and figures on Yoloy's physical and chemical properties, with data on sizes now available and other information you'll need to select Yoloy Continuous Weld Pipe to meet your special requirements. Write for a copy today.

Youngstown

QUALITY YOUNGSTOWN SERVICE

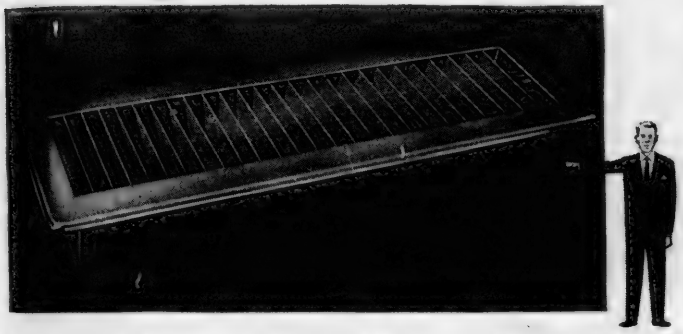
THE YOUNGSTOWN SHEET AND TUBE COMPANY General Offices Youngstown 1, Ohio

Manufacturers of Carbon, Alloy and Yoloy Steel Export Office 500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS ELECTROLYTIC TIN PLATE COKE TIN PLATE - WIRE - PIPE AND TUBULAR PRODUCTS - CONDUIT RODS SHEETS - PLATES BARS - RAILROAD TRACK SPIKES

Standard is always first with the finest

here it is...
the floor register everyone wants!



STANDARD'S NEW PERIMETER FLOOR REGISTER

with Standard's exclusive

Dialamatic Control

Standard's new. exclusive dialamatic control gives you POSITIVE HEAT CONTROL. The set screw arrangement means easy balancing, trouble-free operation!

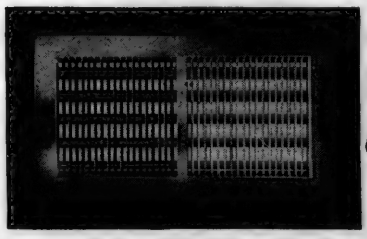
SPECIFICATIONS

The blades of model PH-142 are fabricated of 16 gauge steel, the blades are set in a fixed-fan angle degree for even deflection. The Frame is of one piece, 18 gauge steel construction. The Louvre box fabricated of 16 gauge steel. Packed one to a box, and 20 to a master carton. Comes handsomely finished in gleaming, durable metallic-lustre finish.

Duct opening	Overall of Louvre Box	Overall of Face	Open Area	Depth of Box
2¼" x 14"	2⅛" x 13¾"	3¾" x 15⅜"	80%	2⅛"

THE NEW, IMPROVED *multiple valve* REGISTER

Has Horizontal Multiple Valve Louvres, and 3/16" turned down edge for flush sidewall installation. The attached sponge rubber gaskets are an *extra* feature that prevents escape of air and chipping of wall surface. The Louvres are adjustable so that the flow of air may be directed either downward, straight forward, upward, or to complete shut-off.



MODEL NO. 331

Metallic Finish standard finish on this style

write now!

No cost
or obligation to you

Standard Stamping and Perforating Co.
3129 W. 49th Place Chicago 32, Ill.

Standard Stamping and Perforating Co.
3129 W. 49th Place Chicago 32, Ill.

Gentlemen: Please send me your new pocket catalogue at no cost to me.

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COMPANY NAME

BLAST COILS
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AIR CONDITIONING EQUIPMENT
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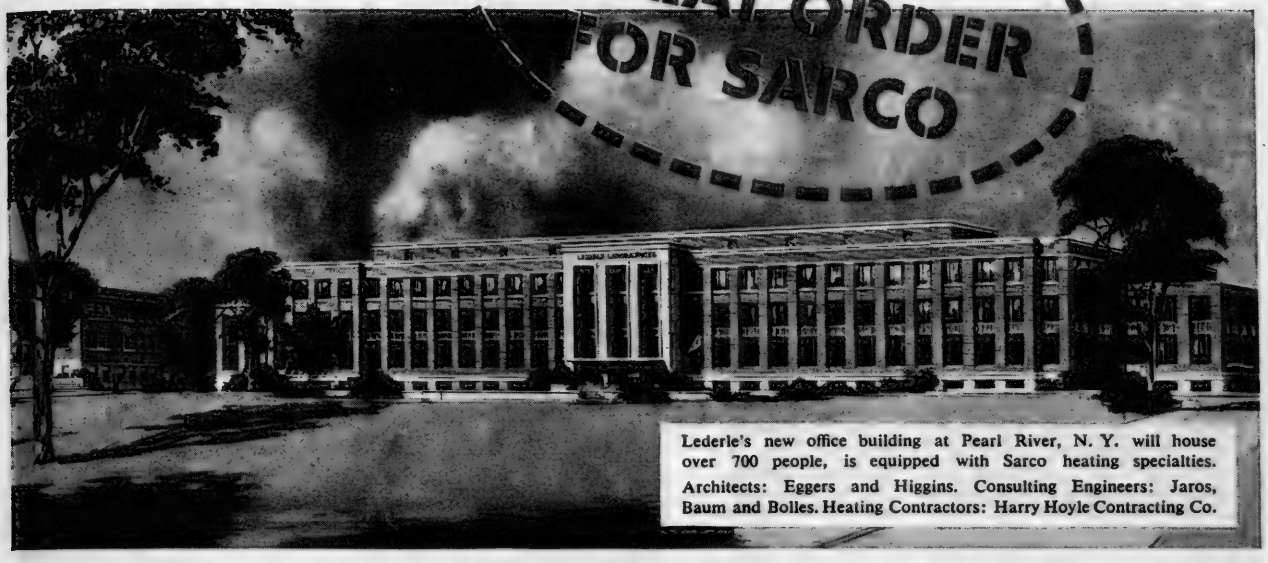
Better health for mankind by providing the best of hospital management and facilities has been the aim and tradition of the Beekman-Downtown Hospital for many years.
In their modern, new home, these ideals have been furthered with air conditioning where needed—Kennard Air Conditioning Equipment was selected to play its part.
KENNARD CORPORATION • 1823 S. HANLEY ROAD ST. LOUIS 17, MO., U.S.A.

The most convincing stamp of user satisfaction

ANOTHER REPEAT ORDER FOR SARCO



Lederle's new office building at Pearl River, N. Y. will house over 700 people, is equipped with Sarco heating specialties. Architects: Eggers and Higgins. Consulting Engineers: Jaros, Baum and Bolles. Heating Contractors: Harry Hoyle Contracting Co.

18 years of repeat orders *and now again . . .*

Lederle Laboratories Division American Cyanamid Co. Installs Sarco Heating Specialties

There's a good reason why Sarco Heating Specialties have been specified and used by Lederle again and again.

That reason is Sarco dependability.

Leading architects, engineers and contractors know from the long record of repeated user approval that they can depend on Sarco performance.

The Sarco heating specialties now operating in this new office building and other Lederle Laboratories buildings have been installed over a period of 18 years. Several thousand Sarco steam traps, radiator valves and traps, air eliminators, strainers, and temperature controls are giving satisfactory performance.

For dependable heating specialties and all around satisfaction, you can confidently specify Sarco.

On your request, we'd be happy to send you full information on Sarco's complete line.

FOUR REASONS WHY IT PAYS TO SPECIFY SARCO

1. Proven Dependability
2. Trouble-free Service
3. Complete Line from One Reliable Manufacturer
4. Nationally Known and Preferred by Users.

SARCO SAVES STEAM

SARCO COMPANY, INC., Empire State Building, New York 1, N. Y.
Sarco Canada, Ltd., Toronto 8, Ontario . . . Represented in Principal Cities

STEAM TRAPS • TEMPERATURE CONTROLS • HEATING SPECIALTIES

Radiator Valves • Traps

Strainers

Float-Thermostatic Traps

Inverted Bucket Traps

Thermostatic Traps

Water Blenders

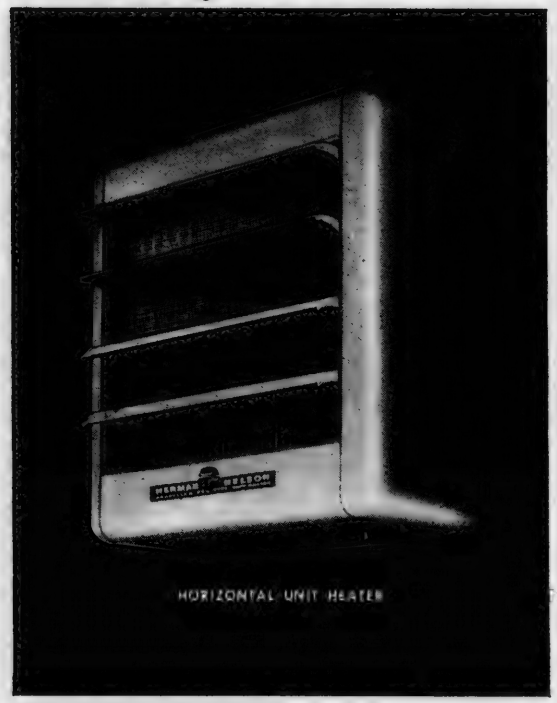
Air Eliminators

Dial Thermometers

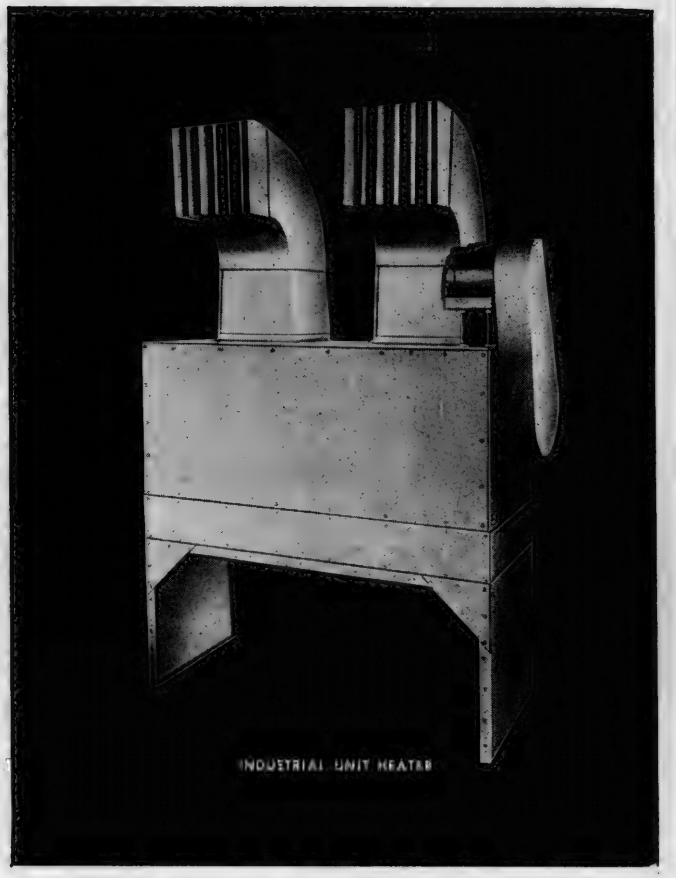
Self-Operated Temp. Reg.

Job-rated HERMAN NELSON
UNIT HEATERS

regular or KING-SIZE...



HORIZONTAL UNIT HEATER


INDUSTRIAL UNIT HEATER

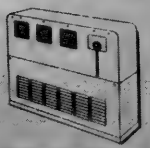
..They Satisfy!

Pleasing customers is easy when you have the complete Herman Nelson line to draw upon! In all, 63 models and sizes in unit heaters, give you a wealth of sizes and capacities to handle all types of installations ... from small stores and offices to large industrial jobs. Herman Nelson Unit Heaters are styled with clean, modern lines ... engineered for efficiency and long life ... backed by a company that has pioneered in the development of heating and ventilating equipment. Standardize on the Herman Nelson line ... the line that means maximum satisfaction to your customers, and maximum profits to you year after year.

SEND TODAY *for complete descriptive literature*

Choose the right unit heater for your job from the complete Herman Nelson line.

Gas-Fired Unit Heater

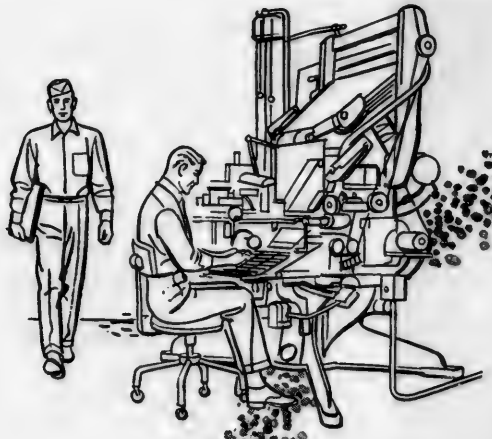

De Luxe Unit Heater

Vertical Unit Heater

AAF herman nelson

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Ky.

AMERICAN AIR FILTER OF CANADA, LTD.
Montreal, P. Q.



WORDS BY THE MILE...ON METAL

The history of tomorrow is being chronicled today on the pages of America's great newspapers. Speed and precision work hand in hand to bring you up-to-the-minute news in accurately set easy-to-read type.

Progress has been the constant and continuing objective of typesetting machine manufacturers since their inception, in 1901. Emerson-Electric was selected to pioneer in the powering of these early machines and over the years has kept pace with the newest developments.

Your product, too, can benefit from Emerson-Electric's 63 years of motor manufacturing experience. We specialize in building dependable motors in ratings from 1/20 to 5 h.p., and hermetic motors from 1/8 to 20 h.p. Your inquiry is invited.

THE EMERSON ELECTRIC MFG. CO.

ST. LOUIS 21, MO.

Write for these Emerson-Electric Motor Data Bulletins

Manufacturers requiring motors 1/20 to 5 h.p. can profitably use these reference guides. Specifications, construction and performance data are included for these motors:

- ☐ 465-A Capacitor-Start
- ☐ 465-B Split-Phase
- ☐ 465-C Integral
- ☐ 465-D Fan-Duty
- ☐ 465-E Oil-Burner
- ☐ 465-F Jet Pump
- ☐ 465-G Blower

EMERSON ELECTRIC

MOTORS • FANS APPLIANCES

Guaranteed TO SHUT TIGHT*

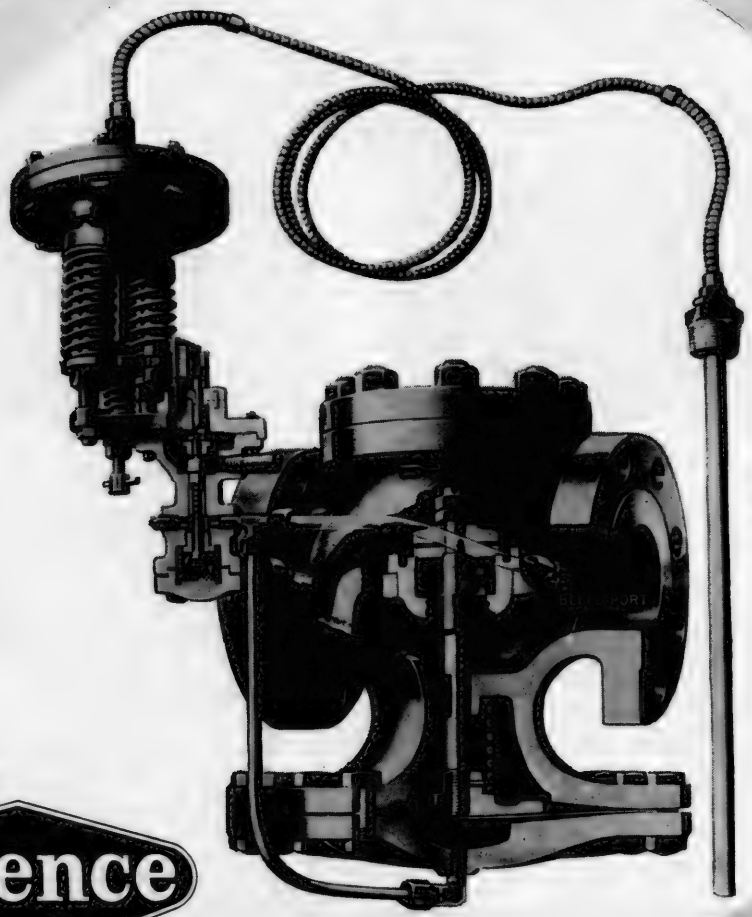
*When equipped with a SECO Metal Seat and Disc on steam service and protected by an approved Strainer, a Spence Regulator is guaranteed to shut tight when the demand for steam ceases.

Expensive steam leaks due to a lack of absolutely tight shutoff are eliminated in Spence Temperature Regulators. Here is why we can make such a guarantee:

First, our temperature regulators are of the single seat design. Seats and discs are made of durable SECO Metal. More than 20 years experience in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

These plus other design features explain why Spence Temperature Regulators function dependably and accurately year after year without requiring expensive repairs or special attention.

Want more facts? Write for Bulletin T50 giving full details.

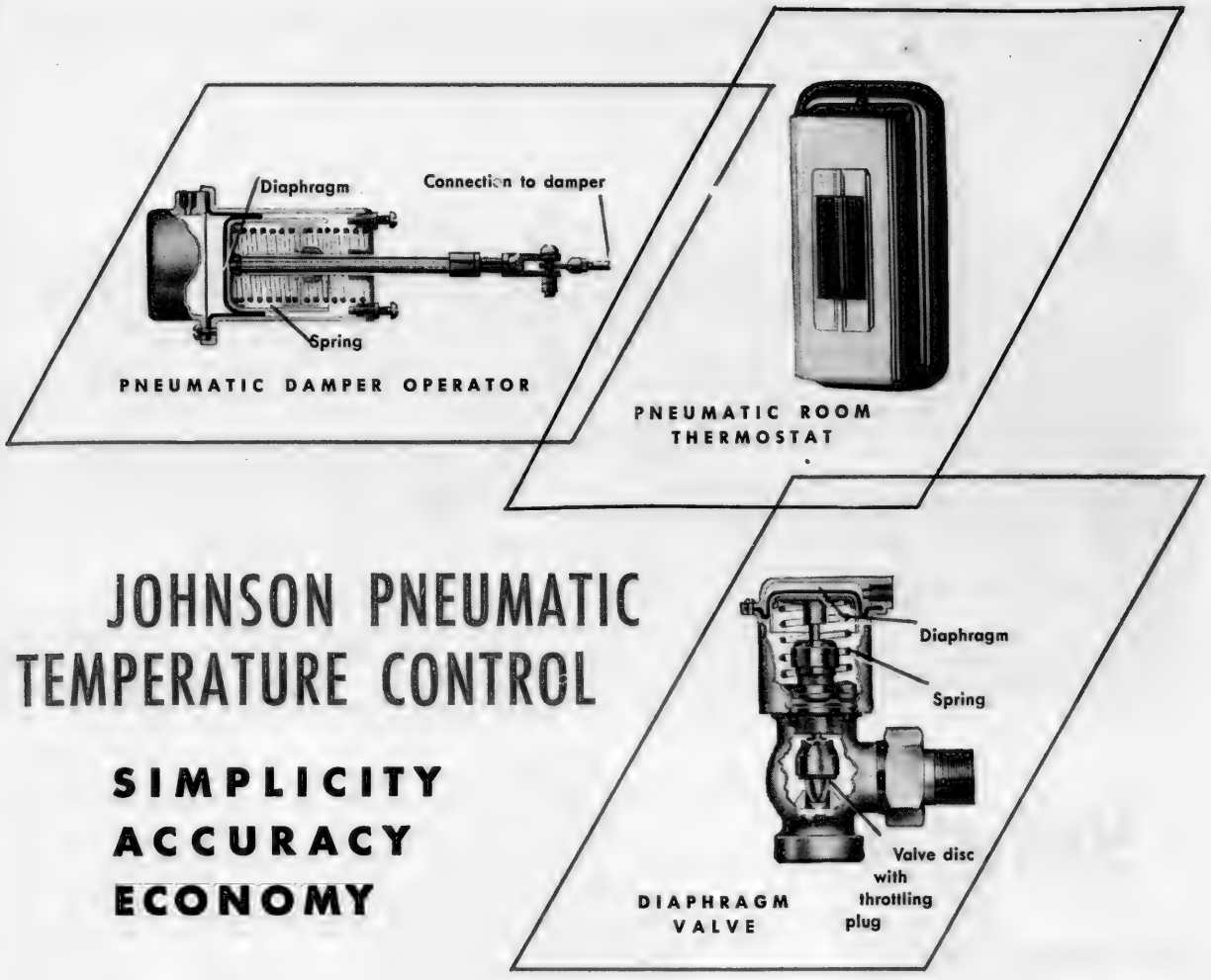


SPENCE
TYPE ET150
Temperature
Regulator

Spence

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

SE 129



JOHNSON PNEUMATIC TEMPERATURE CONTROL

SIMPLICITY
ACCURACY
ECONOMY

Pneumatic power—compressed air—is simplicity itself, adaptable, dependable, economical . . . In the automatic regulation of temperatures and humidities, for example, Johnson *Pneumatic* Control has been the standard since the '80's.

Each Johnson controller is merely a reducing valve in a compressed air line, set and reset automatically by an accurate temperature or humidity measuring element, to transmit compressed air, at varying pressures, to the valves and dampers which it controls. Johnson Diaphragm Valves and Damper Operators, too, are simple devices, with flexible, long-life diaphragms which are inflated as the controllers transmit increased air pressure.

There are no mysteries here. And no complications! The operating cost of Johnson pneumatic equipment is very low—the only expense being the operation of a small compressor to supply air pressure. Where special conditions make it desirable, Johnson furnishes other types of apparatus, such as electronic temperature and humidity controllers, to operate either pneumatic or electric operators.

Attesting to the accuracy, dependability and adaptability of pneumatic control are thousands of Johnson Automatic Temperature Control Systems in textile mills, chemical and food processing plants, schools, hospitals, hotels, shopping centers, airports, office buildings, apartments, and many other types of buildings. The next time you have a temperature control problem, an experienced engineer from a nearby Johnson branch office will gladly prove to you how it can be solved most efficiently by Johnson *Pneumatic* Control. Johnson Service Company, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON *Automatic Temperature and Air Conditioning* **CONTROL**

MANUFACTURING • PLANNING • INSTALLING • SINCE 1885

Wyandotte Chemicals Research Bldg. Architect: Stanton & Hillier. Consulting Engineer: George Wagschal Assoc. Contractor: Walbridge-Aldinger Co.

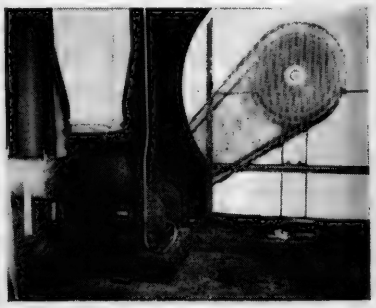
Better Air

for tomorrow's chemical research

Wyandotte Chemicals Corp. chooses American Blower equipment for new multi-million dollar research building

Air — the right kind of air, properly cleaned, conditioned and humidified — is a vital necessity in a modern chemical research laboratory. That's why Wyandotte Chemicals Corp. chose American Blower equipment for their highly functional new research building which has complete air conditioning in every laboratory. American Blower engineers have a complete knowledge of the air cycle and the special problems of many industries. Whenever you have an air handling problem give your nearest American Blower or Canadian Sirocco Branch Office a call.

Individual laboratory exhaust fans (rubber covered and corrosion resistant) have two speeds: slow for normal exhaust; high for experimental work. This allows the chemist to completely control room and hood ventilation.



Secondary air is supplied by an American Blower HS fan with humidifier and dehumidifier, heating and cooling coils. Fan in foreground is American Blower utility set used to ventilate hard-to-reach areas such as stairways, etc.

American Blower Series 81 Sirocco Fan. All Sirocco Fan ratings are certified in accordance with the Standard Test Code.

AMERICAN BLOWER CORP., DETROIT 32, MICH. • CANADIAN SIROCCO CO., LTD., WINDSOR, ONT.

Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

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Put your TUBE TURNS' Distributor on your buying team and deal with one man instead of many . . . place one order rather than several. When it comes to welding fittings and flanges, your TUBE TURNS' Distributor can fill all your requirements. That's because TUBE TURNS, INC. offers industry's broadest line of welding fittings and flanges, covering over 4000 different items, in a complete range of types, sizes, and alloys.

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"⊕" and "TUBE-TURN" Reg. U.S.Pat.Off.

Welcoming

A NEW MEMBER OF THE AAF FAMILY

illinois ENGINEERING

Illinois Engineering Company

CHICAGO, ILL.

becomes a wholly owned subsidiary of the

American Air Filter Co., Inc.

LOUISVILLE, KY.

Illinois Engineering, operating as a Division of American Air Filter, will maintain its present factory, offices and personnel in Chicago, and will continue the manufacture and distribution of its long-established and widely recognized quality line of ILLINOIS steam heating specialties and fluid control equipment.

With this addition, AAF can now offer a more complete and comprehensive service to the heating, ventilating and air conditioning fields.

AAF

American Air Filter
COMPANY, INC.

SEND FOR THIS BULLETIN 400 TODAY!

New Bulletin 400 has information of interest to every engineering department. Keep it handy to answer filtration questions on industrial ventilation.

ELECTRO-STAYNEW BULLETIN CONTAINS...

- detailed diagrams on how the Electro-Staynew cleans air.
- description of all component parts.
- cutaway view of suggested installation.
- complete mechanical and electrical specifications.
- examples of fool-proof safety features.
- report of studies that prove Electro-Staynew sets new standards for economy.
- convenient chart of sizes and material list.

DOLLINGER PROTECTED CORD STAYNEW FILTERS

DOLLINGER CORPORATION

15 Centre Park Rochester 3, New York

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

The first line of reducers is still the foremost line

T F

Old timers will recall the day—more than 20 years ago—when Taylor Forge announced the first comprehensive line of butt-welding fittings.

Before the WeldELL line was introduced, the only available welding fittings were elbows. But in the WeldELL line came all the fittings needed to do a complete and workmanlike job of pipe welding . . . the tees, reducers, caps, stub ends, and welding flanges.

To produce all of these types of fittings in seamless forged steel was a giant undertaking—and still is. A good example of this is the line of reducers. Today there are 175 reductions in standard weight reducers alone—and this can be multiplied by all the weights and materials in which Taylor Forge reducers are available.

The first line is still the foremost line—the engineered line, the full value line. For up-to-the-minute facts about the WeldELL line, see your Taylor Forge Distributor.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS
General Offices & Works • Chicago 90 • P. O. Box 485
Plants at: Carnegie, Pa., Fontana, Calif., Gary, Ind., Hamilton, Ont., Canada

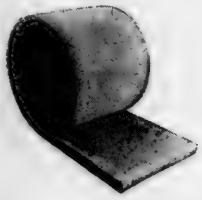
MUST READING for the residential air conditioning trade!

Thermal and acoustical insulation of ducts can "make or break" an air conditioning job. That's why Gustin-Bacon, manufacturers of glass fiber duct insulation for air conditioning, has prepared a new booklet offering suggestions of value to oldtimers, as well as newcomers in the field. Write for your free copy today.

Answers such questions as these . . .

- *"Which ducts require thermal insulation?"*
- *"When should I use a duct insulation with a vapor barrier?"*
- *"What kind of acoustical treatment do ducts require?"*
- *"What are the fastest and cheapest methods of applying duct insulation and duct liner?"*
- *"Do combination units require special duct insulation?"*

Mail This Coupon Today!



ULTRALITE DUCT INSULATION
(Thermal)
and
ULTRALITE DUCT LINER
(Acoustical)

are insulations of long glass fibers specifically designed for air conditioning application. They are light, flexible, resilient, easy to cut with a knife. "Job size" packages are stocked in 72 cities for prompt delivery. Consult the yellow pages for name of your nearest Ultralite distributor.

☐ Please send me your new "How-To-Do-It" folder on duct insulation and duct liner for residential air conditioning.

☐ Please send your brochure on Ultralite Duct Insulation and Duct Liner for commercial and industrial air conditioning.

Name_____

Firm_____

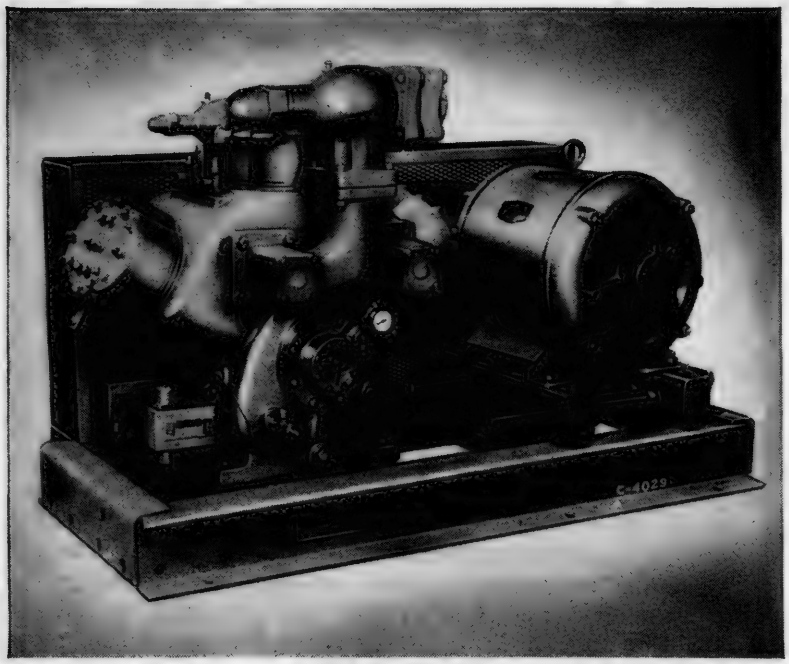
Address_____

City_____ State_____

gb GUSTIN-BACON MFG. CO.
222 W. 10th St., Kansas City, Missouri

New York • Chicago • Philadelphia • San Francisco • Los Angeles
Houston • Tulsa • Dallas • Detroit • St. Louis

The whole industry's talking about Worthington's new Freon compressor



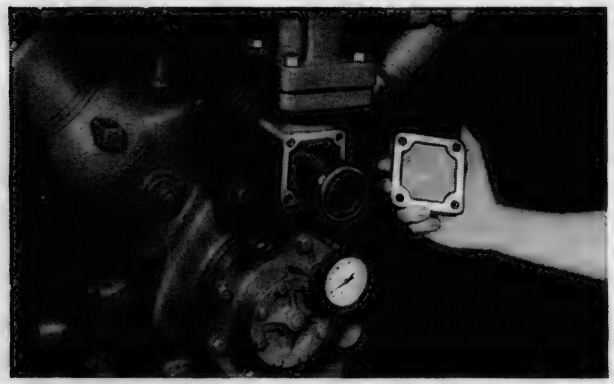
TRIM, STURDY CONSTRUCTION marks this 4JF6 compressor unit — 50-60 hp, six cylinder W-type compressor. The complete compact unit consists of fabricated steel base, compressor with valves, gauges and safety controls, drive and safety guard. Designed to operate in conjunction with Worthington evaporative condensers in localities where city water is scarce or high in cost. Also available with shell and tube condenser. Complete range from 3-150 hp.

"The high capacity unit we've been waiting for!"

"Greater operating efficiency!"

"There's nothing else like it!"

And every comment you hear is true! The refrigeration compressor is the most vital element of any air conditioning or refrigeration system. That's why Worthington spent years in developing the new "J" Freon compressor. That's why Worthington invested over a million dollars in compressor research. *And that's why you can't find its match in any other unit.* Only a few features of the new "J" Freon compressor are highlighted here — get the full story by contacting your nearest Worthington district office or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.4.33, Harrison, New Jersey.



EASY REMOVAL of suction gas strainer for cleaning is made possible by new suction manifold design. No pipes, valves or other parts need to be dismantled in order to get at the strainer. And Worthington's new electric unloaders automatically balance power consumption with load requirements.

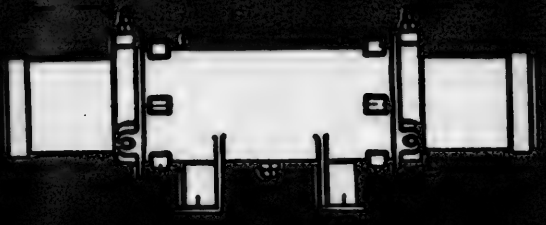
LORD & TAYLOR'S new West Hartford, Conn., store depends on Worthington to provide comfortable air conditioning for its customers. Two 150 hp "J" compressors and two evaporative condensers make up the highly efficient Worthington air conditioning team at this modern store.

A.4.33

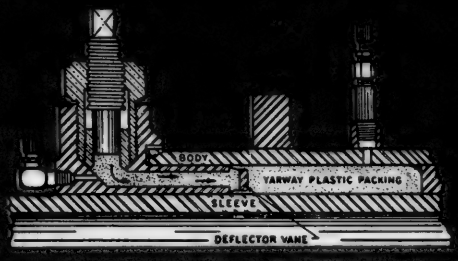
WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

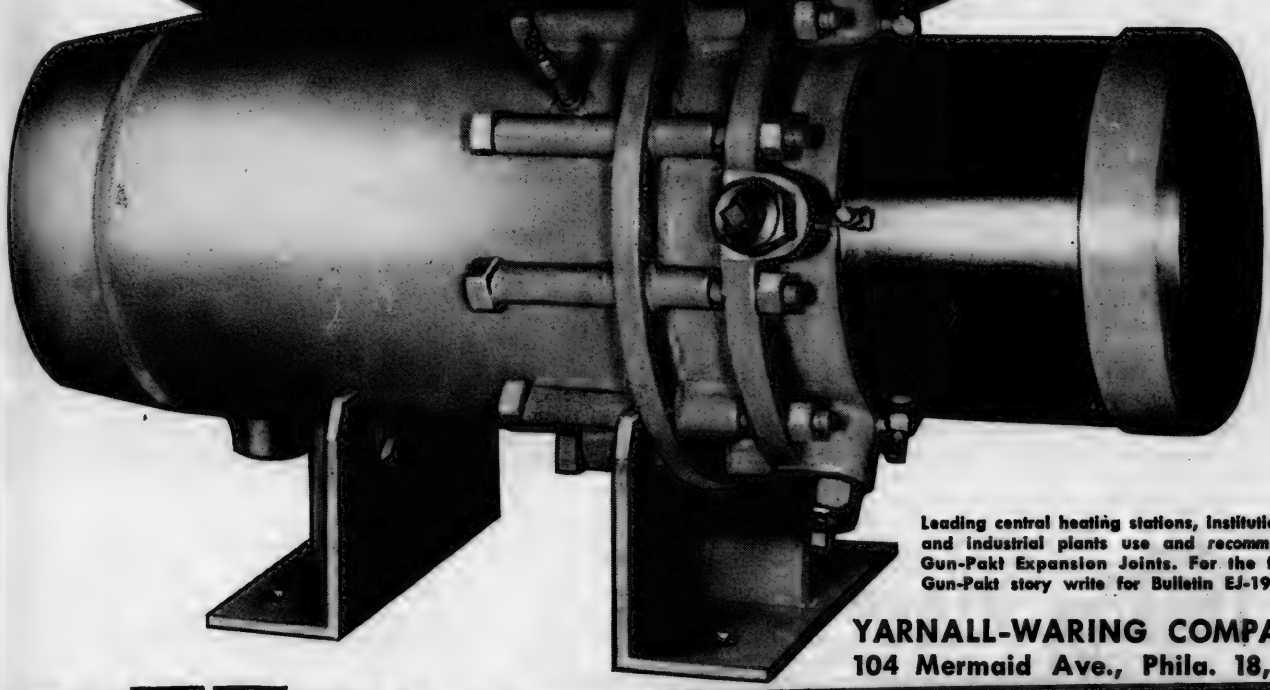
YOU NEED FEWER JOINTS



AND LESS MAINTENANCE



GUN-PAKT



Leading central heating stations, institutions and industrial plants use and *recommend* Gun-Pakt Expansion Joints. For the full Gun-Pakt story write for Bulletin EJ-1912.

YARNALL-WARING COMPANY
104 Mermaid Ave., Phila. 18, Pa.

YARWAY GUN-PAKT EXPANSION JOINT

NEWS FOR YOUR INDUSTRY....

Libbey·Owens·Ford Announces Super·Fine Fiber·Glass Furnace Insulation

A new line of facings applied to Super·Fine Fiber·Glass insulating blankets has been announced by Fred W. Segerstrom, manager of Super·Fine sales for Libbey·Owens·Ford Glass Company in Toledo. The new line includes aluminum foil reflective facings widely used in the furnace industry.

The facings, Mr. Segerstrom said, may be applied to any standard Super·Fine insulation regardless of thickness or density of the blanket.

High Thermal Protection

Super·Fine is an outstanding product for high thermal insulation protection. Addition of an aluminum facing gives the product additional advantages of a reflective surface, Mr. Segerstrom pointed out. In addition to aluminum foil, he indicated, other types of facings are available.

Withstands 450° to 600° F.

Regular Super·Fine Fiber·Glass withstands temperatures up to 450 degrees F. For specialized application, Mr. Segerstrom said, L·O·F makes Super·Fine with binder #22 for temperature ranges to 600 degrees F.

A high temperature adhesive is applied to the side casing of Bryant gravity-type furnace, model GH 57. It is now ready for the application of Super·Fine.

Applying Libbey·Owens·Ford Super·Fine Fiber·Glass insulation with aluminum foil reflective facing to side casings of Bryant furnaces. The aluminum foil facing provides additional insulation by reflection of radiant energy.

For further information about Super·Fine with binder #22 and foil facing, contact your nearest L·O·F office (offices in 26 cities). Or write Libbey·Owens·Ford Glass Company, Fiber·Glass Division, 3114 Wayne Bldg., Toledo 3, Ohio.

L·O·F GLASS Corrugated FIBER·GLASS

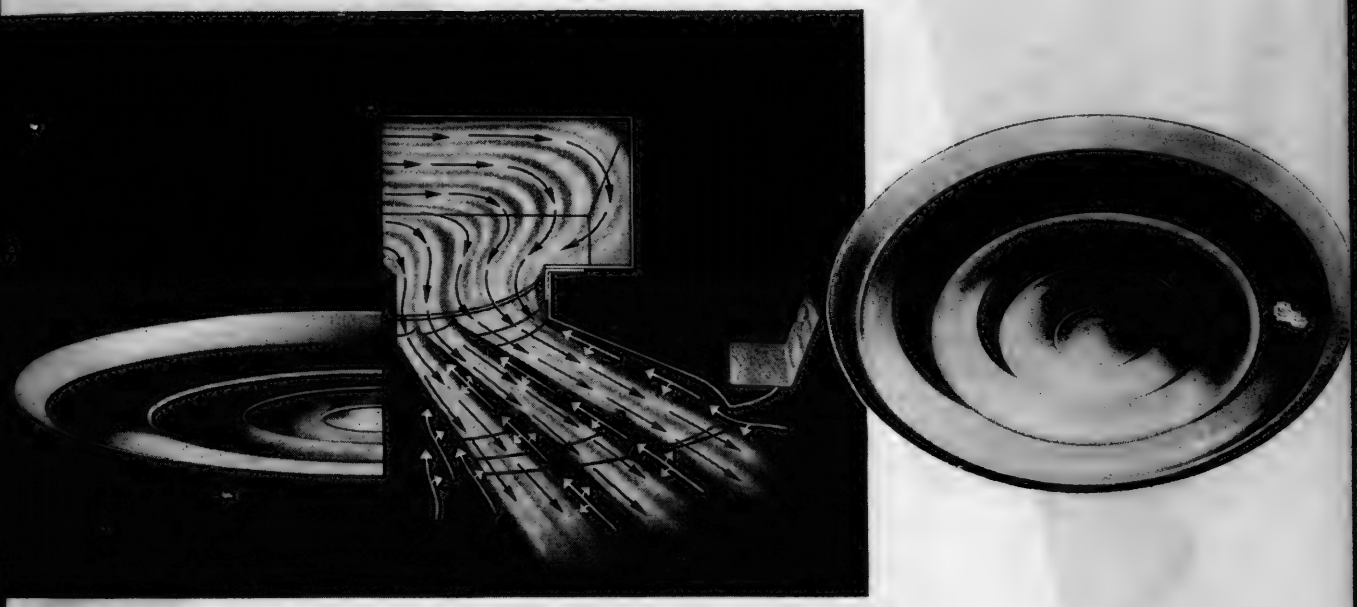
FIBER·GLASS

LIBBEY·OWENS·FORD GLASS COMPANY
FIBER·GLASS DIVISION

ANEMOSTAT

key to

comfort in air conditioning



The aspiration principle of all Anemostat Air Diffusers is the induction of room air into the outlet by the primary air stream.

ANEMOSTAT®

DRAFTLESS *Aspirating* AIR DIFFUSERS

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39th STREET, NEW YORK 16, N. Y.

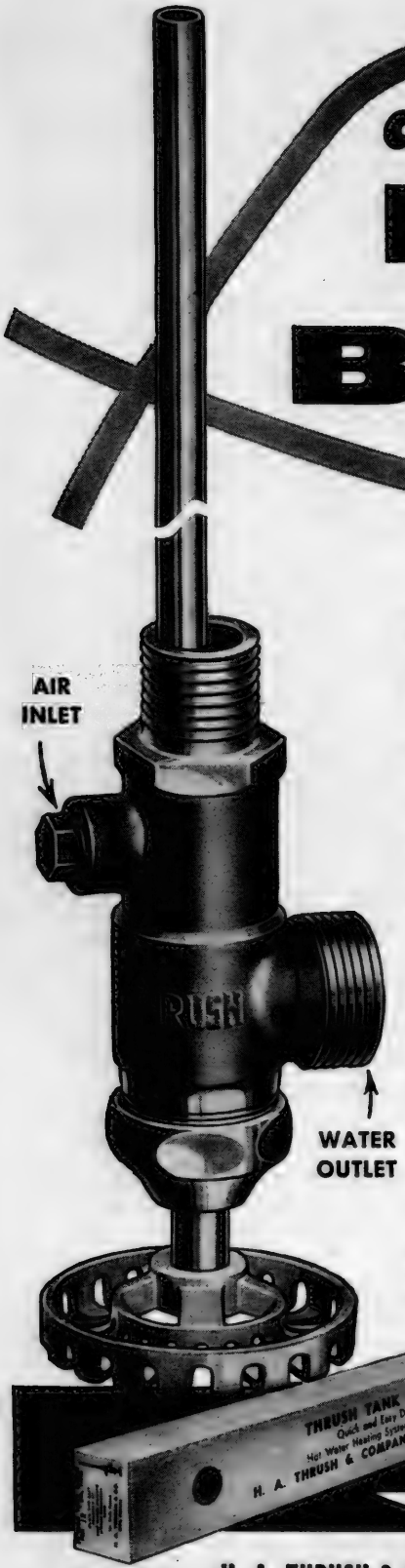
REPRESENTATIVES IN PRINCIPAL CITIES

"No Air Conditioning System Is Better Than Its Air Distribution"

Seventeen years ago, Anemostat Corporation of America introduced the Aspirating Air Diffuser, which was promptly accepted by the air conditioning industry. • Through research and development and experience gained over the years in tens of thousands of installations, we have consistently improved the quality and performance of Anemostat products. • Value, quality and performance of Anemostat Air Diffusers are still unequalled—there are no "substitutes" for Anemostat Air Diffusers.

AC1317

a real... PROFIT BUILDER


AIR INLET
WATER OUTLET
THRUSH TANK DRAIN
Quick and Easy Draining of
Hot Water Heating System Expansion Tank
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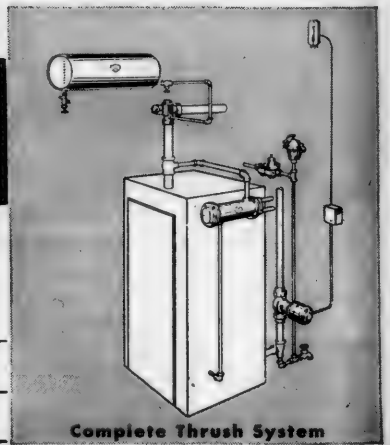
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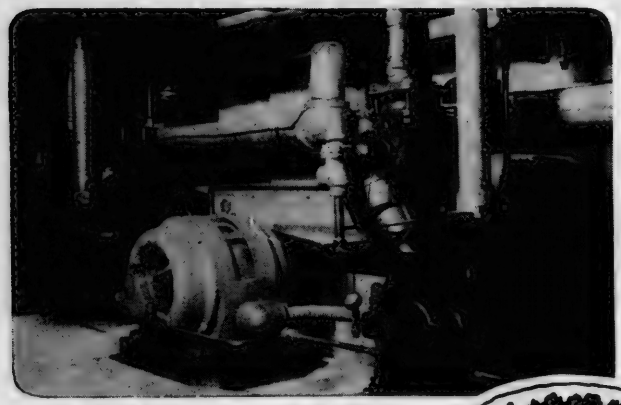

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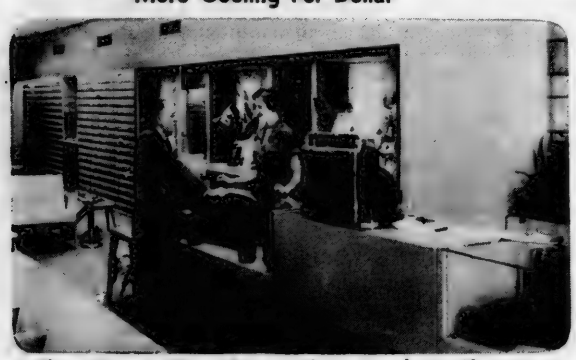

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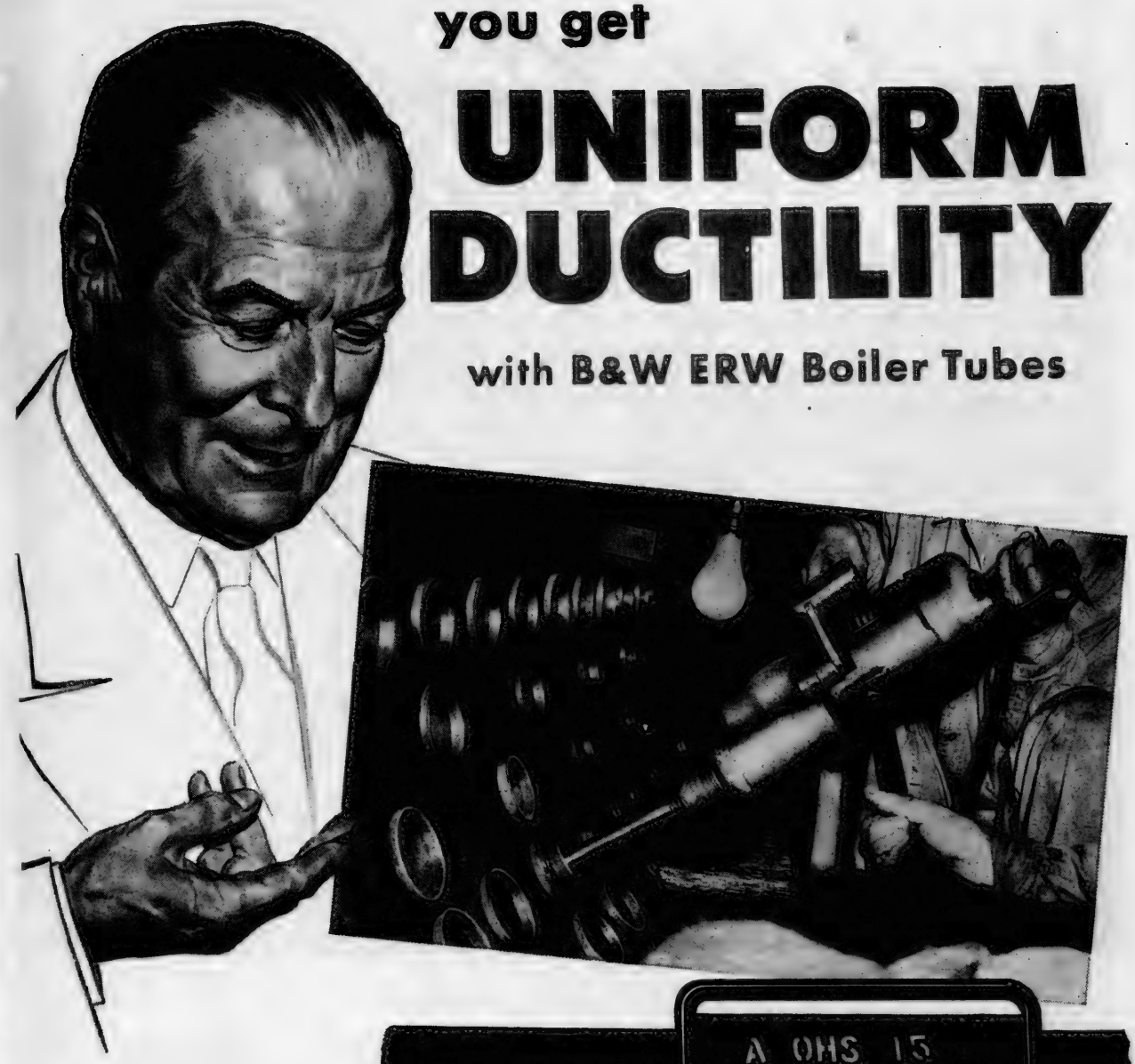

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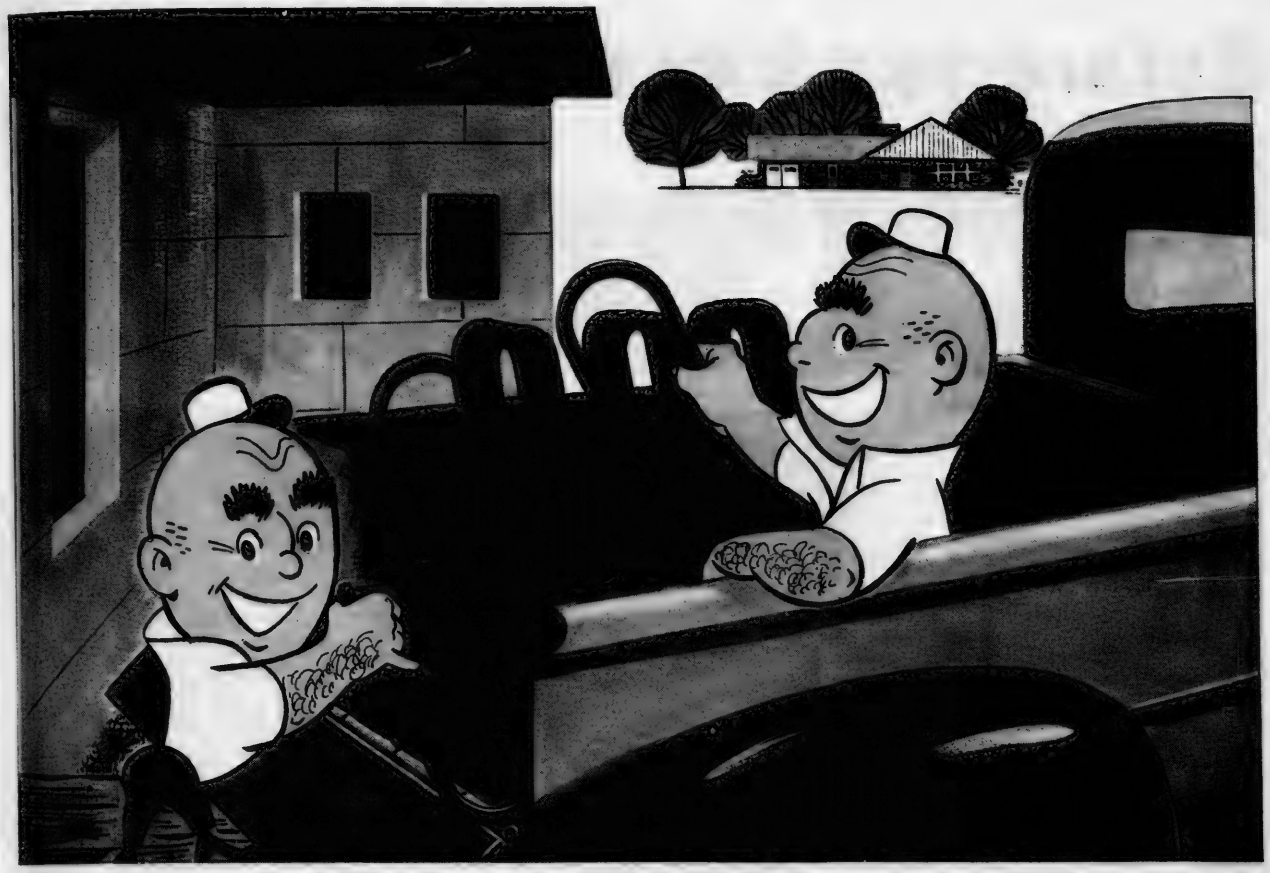

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Compare
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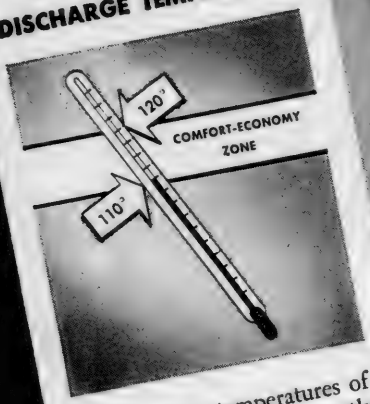

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GAS-FIRED units that top the field . . . with *stainless steel* heat exchangers and burners

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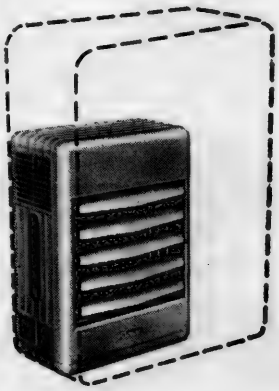

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U-1202

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As the leader in the development and application of steam and hot water unit heaters for more than 25 years, Modine brings unequalled experience to gas unit heating problems. It is the *only* manufacturer to publish heat throw data for gas-fired units. For facts, ask for Bulletin 653. Modine Mfg. Co., 1511 DeKoven Avenue, Racine, Wisconsin.

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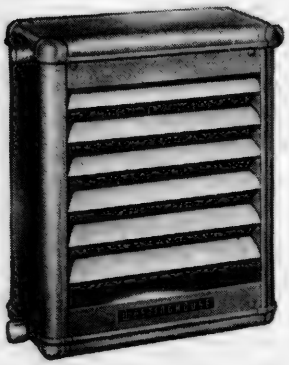

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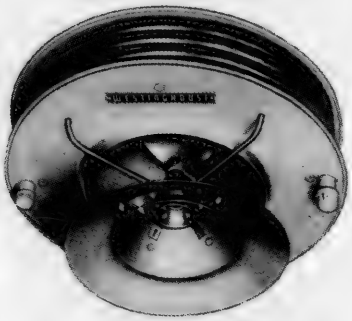

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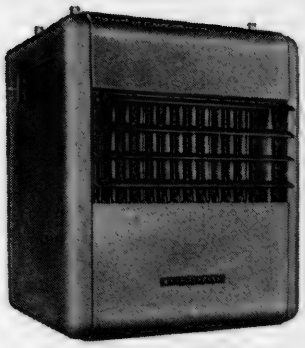
Delivers heat into working areas. 12 standard sizes for steam or hot water. Capacities from 25,000 to 400,000 BTUH.



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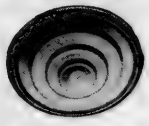
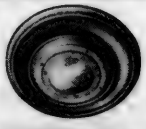
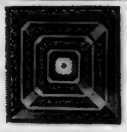
Yes, Carnes leads with a line of diffusers that's way ahead! *You've told us* what you wanted . . . and we have incorporated all the *best* ideas, all the *newest* developments that engineers and architects demand. Beautiful styling, easy installation, and complete adjustability for all air patterns, plus quiet operation. And remember, . . . Carnes is *top quality* at *low price* that will save you real money! Your best bet *is Carnes!*

MODEL		NECK SIZES	CFM OUTPUT	DESCRIPTION	
E-1	Supply only fixed cone	5 to 32	50 to 13,400	A flush mounting diffuser designed primarily for exposed duct applications. Or where obstructions make recessed mounting impossible. The set pattern is for horizontal throw.	
E EJ ER	Supply only fixed cone Supply only adjustable cone Supply and return fixed cone	5 to 32	50 to 13,400	This expanded cone diffuser is constructed with the same number of cones in all styles or sizes giving a uniform appearance when various styles or sizes are used in the same area. The fixed cone model "E" can be set for vertical or horizontal pattern.	
BR BRS	Supply only adjustable cones Supply and return adjustable cones	6 to 32	115 to 13,400	A beautifully styled multicone diffuser featuring easy installation and simple adjustment for various air patterns desired, available with a full line of accessories to make balancing the system a simple matter.	
EH	Half round supply only fixed cone	6 to 20	50 to 2,725	The model EH is styled along the identical lines of the other series E models. A unique feature of this diffuser is that the inner vane assembly can be set for either horizontal or vertical air pattern which makes it adaptable for either ceiling or sidewall installations.	
QSL	Combination diffuser and lighting fixture adjustable	8 to 17	210 to 2,670	The model QSL combination diffuser and light is designed to harmonize in appearance with either the model "E" series or the BR and BRS. The cone assembly can be set for any of three positions for horizontal, vertical or intermediate air pattern.	
SFS SFR	Supply only surface type fixed cone Supply only recessed type fixed cone	8 x 8 to 20 x 20	150 to 6,925	These square and rectangular diffusers with the corner air scoops give a full 360° air pattern thus giving round diffuser performance from a square or rectangular unit available in both recessed and flush mountings and with a full set of accessories.	

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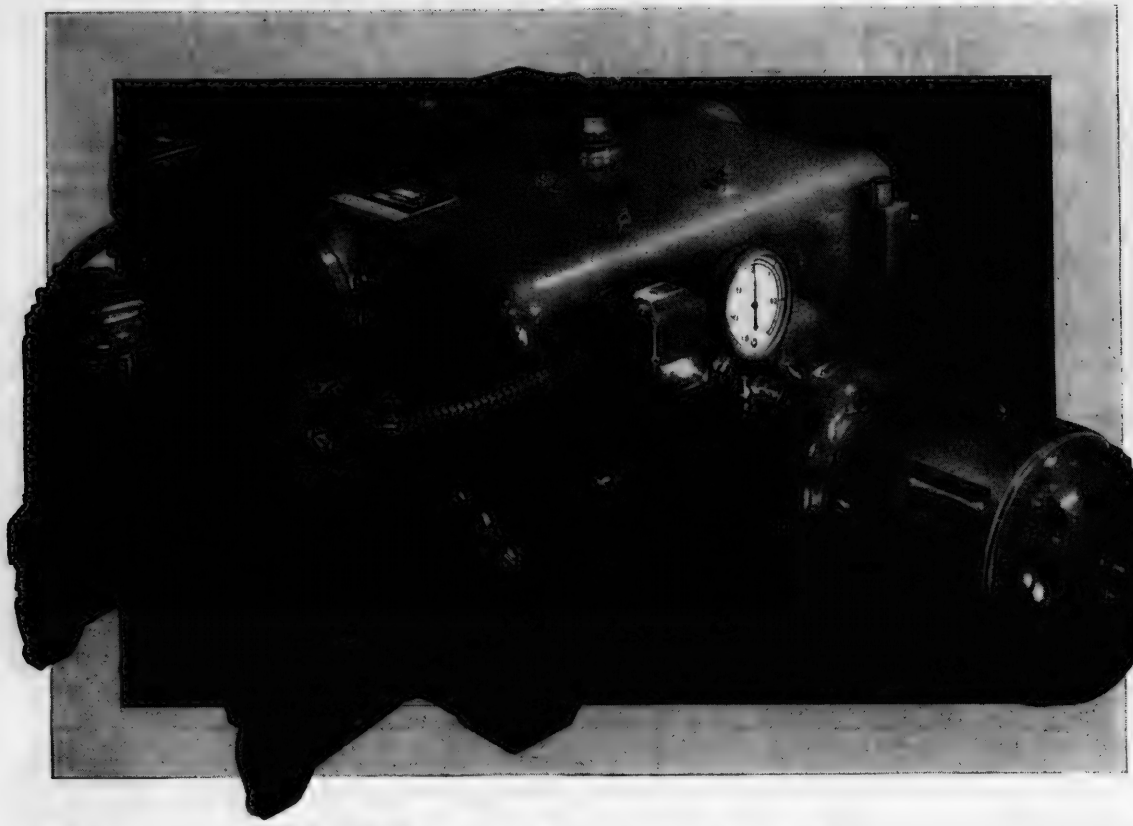
THIS NEW VACUUM HEATING PUMP

HAS THE INCREASED AIR CAPACITY EFFICIENT HEATING PRACTICE DEMANDS



It's the Nash CSM

Designed and manufactured by the organization that made the Jennings Manifold Heating Pump standard of the Heating Industry, the new CSM incorporates every desirable feature architects, engineers, owners and operators have sought. Employing separate air and water pump elements, each with its own motor and each independently controlled by its own automatic switch, the capacities and arrangement may be widely varied to meet job conditions. For the first time, the engineer has the choice of realistic water and air capacities required for rapid system response without wasteful overheating.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

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Fig. 1. Spray painting poses new problems.

Ventilation for Ship Construction and Repair

GEORGE S. REICHENBACH, JR.

Industrial Hygiene Engineer, Bethlehem Steel Company, Sparrows Point, Maryland

In the construction and repair of ships, ventilation is required in the work of two crafts, welding and painting. While much has been written about ventilation problems stemming from the war-accelerated substitution of welding for riveting, the concurrent change from brush to spray painting has not been particularly emphasized in either general or technical literature. This article is intended as a statement of one company's methods of handling ventilation during spray painting of large and enclosed surfaces.

THE wartime conversion to spray painting met with as much resistance from ship owners and operators as did welding, and there are some operators who still prefer brush painting even at much greater cost and time. At the present time, however, brush painting is practically used only for trimming out.

This change in method of application of paint has caused a serious potential problem for the following reasons:

(1) Increase in the application rate of paint.

(2) Increase in solvent content of paint, due to need for thinner materials for spraying.

(3) Increase in the inherent toxicity of solvents, due to the development of plastic type paints.

Spray painting of exterior surfaces of ships, either on the ways or in drydock, offers no particular hazard except when using paints which have toxic metals as the pigment. This is sometimes the case, such as when red lead priming is required or anti-fouling paints are used for the areas of the hull below the water line. In these cases, suitable

respiratory protection is furnished to the men exposed. Spray painting of interior surfaces and the satisfactory control can best be illustrated by two different applications which have become standard procedures in the Baltimore district of Bethlehem Steel Company.

Spraying of Ballast Tanks on 28,000 Ton Super Tanker with Bitumastic. This particular job was unusual in that the material being sprayed was in the form of a viscous mass. A high pressure pump of the type used for grease lubrication served to introduce the material to the spray gun head. At this point it was atomized with air. The two tanks sprayed are on the sides of the ship and extend from the main deck to the keel. The dimensions are 40 by 22 by 44 ft. The bitumastic was typical of that found in preservative coatings, and one of the most troublesome aspects of using this material is its photo-sensitizing effect on the skin that may result in dermatitis. In addition to this factor, the spray contained very large amounts of fine mist that would rapidly have limited visibility in the tanks. Precautions established prior to start of this job were as follows:

(1) Painters were required to wear impermeable suits with head covering such as those shown at the head of this article.

(2) Painters were required to wear air line respirators and goggles to protect eyes.

(3) Explosion-proof lighting and adequate fire protection were furnished.

(4) Ventilation was furnished by axial-flow fans rated at 5000 cfm at three inches of water static pressure. These fans were installed to exhaust through 15-inch Butterworth connections (Fig. 2) with the supply entering the tanks through 36-inch manholes. With discharge velocities of 800 fpm, the entrainment ratio is 15. This, in conjunction with a throw of 50 fpm at 32 feet, gave good circulation and dilution ventilation in the tanks.

Fig. 2. Butterworth connection exhausts tanks below decks.

George S. Reichenbach, Jr. is industrial hygiene engineer at the Sparrows Point plant of Bethelhem Steel Co. He graduated from Catholic University, Washington, D. C., in 1940 with the degree of Bachelor of Applied Chemistry. After two years with the Division of Industrial Hygiene, U.S.P.H.S., he served as an aircraft engineering officer with the U. S. Army Air Forces. After the war he returned to complete his Masters Degree in industrial hygiene at Harvard School of Public Health, he joined the Bethlehem Steel Co. in 1950. The present article is based on a paper delivered by Mr. Reichenbach before The American Industrial Hygiene Association.

Advantages gained through these provisions have been:

(1) No need for abnormal relief periods for personnel.

(2) Minimum amounts of holiday, eliminating touch-ups.

(3) In combination with engineering features productivity on this type of work has increased 30%.

Spraying of Deep Tanks with Vinyl Resin Paints. As part of a routine repair and maintenance order on a Victory type ship, the owners specified the sandblasting and spray painting of the deep tanks. There are four deep tanks in a Victory ship. The tanks are 11 ft deep, and total volume is 37,100 cu ft. These tanks had hatches 14.5 by 8.5 ft and trimming hatches 4 by 4 ft. The necessary scaffolding was erected in each tank to enable the painters to be close enough so that the spray would be wet when striking the plate. The spray painting was to consist of a vinyl type wash primer, a second coat of "liquid stainless steel," and the third and fourth coats to be of a clear vinyl resin type. These materials were all proprietary compounds and the application was experimental. The solvent was methyl isobutyl ketone and the diluent was toluene, which is typical of vinyl resins. The only previous attempt with a similar application of which I have knowledge, was by a subcontractor at another shipyard, with a resulting explosion causing the death of two men and injury to two others. In order to prevent such an accident occurring during this application of the vinyl paints, the following procedure was established.

(1) The area around No. 4 hold was posted with signs forbidding "hot work" and smoking. A fireman was assigned to enforce these prohibitions. All matches and lighters were removed from men working in the vicinity.

(2) Workmens' shoes were examined for protruding nails, rubbers were furnished those men whose shoes could give a spark.

(3) Lighting was provided by explosion-proof portable lamps with connection boxes installed on the main deck.

(4) Suitable hoses with fog nozzles and applicators were connected and placed on the main deck and fire extinguishers were on hand.

(5) It was determined that sufficient ventilation could not be provided to the tanks to eliminate the possible toxic hazard of the solvent fumes. Ventilation was installed in the following manner to eliminate the explosive hazard: Each of the four deep tanks was ventilated by two vane axial fans, each having a capacity of 5,000 cfm at 3 inches

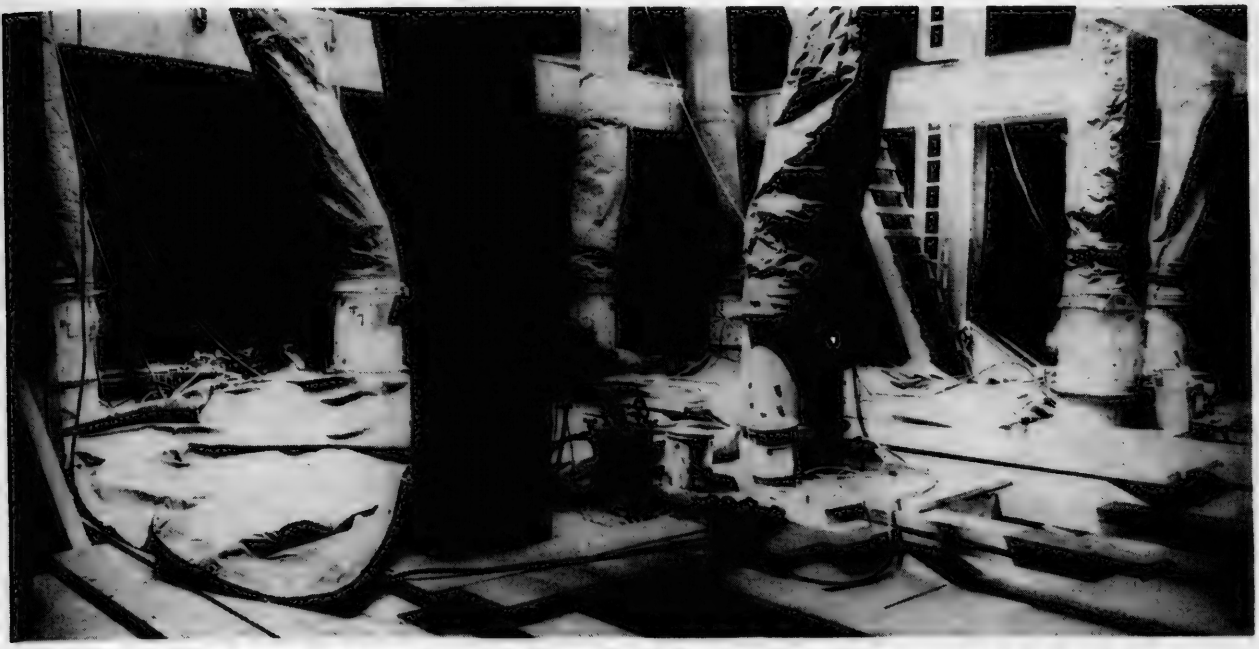

Fig. 3. Vaneaxial fans exhaust tanks through canvas ducts. Planks support fans while tarpaulin prevents by-pass and assures deep ventilation of space below.

w.g. static pressure. These were driven by 5 hp direct-drive motors. The fans were installed on planks laid over the hatch openings so they would exhaust the tank (Fig. 3). The remainder of the hatch opening was covered with tarpaulins and boards to make the hatch as air tight as possible in order to eliminate by-passing of the air.

Trimming hatches were left open in order to provide access to the tanks and to allow entry for supply air. The electrical control panel for the fans was set up on the weather deck and protected by a tarpaulin so that vapors could not be ignited by the switch gear. Canvas exhaust ducts 24 inches in diameter were connected to the fan discharge and these extended to the weather deck hatch coaming (Fig. 4). The inlets to the fans had metal ducts installed with the intakes at different levels to eliminate stratification of the air. Use of the fans as exhausters, rather than supply gave two important safeguards. The first was that the access ladder was being swept at all times by uncontaminated air. The second was that by carrying the exhaust above the weather deck hatch coaming, recirculation and buildup was avoided and the 'tween deck spaces and lower hold were not contaminated with solvent vapor.

Fig. 4. Canvas ducts bring fumes to upper deck.

This arrangement of ventilation was checked before any painting was performed and distribution in the tanks was found to be excellent due to the high velocity of air through the trimming hatch and the location of the exhaust inlets. Air volumes being handled by each fan were in the range of 10,000 cfm. This gave a velocity of 1,200 fpm entering the tanks through the trimming hatches.

(6) As an additional safeguard, a chemist, certified by the American Bureau of Shipping was retained to make constant readings of the explosive content of the air. Samples of the materials had been furnished to him in order to calibrate his instrument for the explosive range. Procedure used was to start one painter spraying in the tank and readings were taken in his vicinity. These showed concentrations well below the lower explosive limit.

A second man was then started spraying in the same tank. When the sprayers were far apart the readings were low but as they came close together the readings rose to over 50% L.E.L. in the direct exhaust. After this check only one painter was used in each tank.

(7) Since it had been decided that ventilation was practical only to the extent of controlling the explosive hazard, all painters were supplied with air line respirators. Foremen, chemists and other personnel who were required to enter the tanks were furnished chemical cartridge respirators.

(8) The four coatings were applied to all tanks routinely with production rates being 5 gallons per sprayer per hour for coats one and two and 7 gallons per sprayer per hour for the third and fourth coats. These rates are similar to those given by spray gun manufacturers but are misleading for ventilation calculations as these are average

rates and include time for shifting, lighting, moving around on scaffolding and other non-painting tasks. The ventilation furnished was advantageous in that no time was needed between paint coatings for curing and this made it possible to complete the job in less than the estimated time.

Summary

In general it is seldom possible to furnish sufficient ventilation to enclosed areas of ships which are being spray-painted to eliminate the health hazard from solvents and diluents. It is possible and mandatory to ventilate at a rate which maintains the area free from explosive hazards. Equipment to provide this ventilation must meet the following specifications:

(1) Must be rugged as it will be handled frequently by cranes.

(2) Must be compact to minimize deck area used and storage area when not in use.

(3) Must have good static pressure characteristics as entry losses are determined by available openings and not by ventilation design.

(4) Must be well-designed for service and maintenance.

(5) Must be flexible for location.

The above requirements have been best met in our experience by the vane-axial fans.

Electrical Measurement of Corrosion Rate

A RECENT laboratory study by NBS proves for the first time that the rate of weight loss of a piece of steel corroding normally in soil can be measured electrically, without actual weighing of the metal. Conducted by W. J. Schwerdtfeger and O. N. McDorman of the Bureau's corrosion laboratory, the study gives further evidence that the electrochemical theory of corrosion applies generally to soils. Although the NBS measurements were restricted to the laboratory, the success of the work suggests the possibility of valuable practical applications, such as determination of the corrosion rate of a tank or other underground structure without the need for visual inspection.

When iron or steel is exposed to the soil, local differences in electrical potential develop at the surface of the metal, resulting in the formation of numerous small corrosion cells. This means that electric currents flow through the soil from certain areas (anodes) to areas of less negative potential (cathodes), with accompanying discharge of hydrogen ions at the cathodes and loss of metal from the anodes. By Faraday's law, the rate of weight loss from corrosion is proportional to the current.

The NBS-demonstrated measuring technique is based on a relation established by other investigators, who showed that the current in a corrosion cell can be expressed in terms of the values of anodically and cathodically (positively and negatively) applied direct current, from an external source, that will just reduce the cell current (corrosion current) to zero.

The corrosion cells used by previous investigators in confirming the equation experimentally contained separated anodes and cathodes so that I_p and I_q (required cathodic and anodic currents) could be directly measured, and the corrosion currents computed therefrom compared with values obtained by direct measurement. However, when a single piece of metal is exposed to a corrosive medium, as in the NBS study, it is obviously impossible to measure these currents directly. Here the corrosion current, made up of innumerable small cell currents, must be determined indirectly, if at all, from changes in slope of the current-potential (polarization) curves. The NBS study demonstrates for the first time that the total corrosion current i_0—and thus the weight loss—of a single piece of metal normally corroding in soils, and presumably in other aqueous media, can be determined by the equation from values of I_p and I_q obtained from the changes in slope of the cathodic and anodic polarization curves.

In establishing the feasibility of the indirect measuring technique, the Bureau investigators exposed weighed steel specimens, differentially aerated, to five corrosive soils for approximately 2 months. The soils ranged in reaction from very acid (pH 2.9) to very alkaline (pH 9.6). Because of the possibility of changes in rates of corrosion during the 2-month period, polarization curves were obtained at intervals throughout the exposure period. At the end of this period the specimens were removed from the soils, cleaned, and reweighed. Actual weight losses were compared with weight losses calculated indirectly by Faraday's law by use of values of corrosion current (i_o) obtained from the equation on the basis of values of I_p and I_q indicated by changes of slope in the polarization curves. The calculated values of weight loss differed on the average from the actual values by approximately 4%.

This technique for indirect electrical measurement of corrosion rate appears to have possibilities for extensive application both in the laboratory and in the field. In laboratory determinations of the corrosion rate of certain materials, for instance, the weight loss resulting from corrosion might actually be exceeded by the cleaning error. The electrical method makes possible much more accurate comparisons of the corrodibilities of such materials. For field determination of underground corrosion the electrical method, if it proves practicable in the field as well as in the laboratory, would have several advantages in addition to obviating the need for excavating the underground object. Although in some soils ferrous metals corrode at a constant rate year after year, in other soils corrosion gradually slows down and in time may virtually cease. Actual weighing or inspection of an object that has been buried for years will indicate how much total corrosion has occurred but will not show how rapidly, if at all, it has been corroding just prior to inspection. The electrical method, on the other hand, measures the present corrosion rate, which is likely to be of greater practical interest than the history of past corrosion. Furthermore, the electrical method does not involve the removal of corrosion products, which often inhibit corrosion.

New Application Techniques Improve

Residential Air Conditioning

E. P. PALMATIER

Director of Research, Carrier Corporation

Choosing the energy sources for summer and winter air conditioning of homes is aided by cost data on a variety of systems including the heat pump. A method of estimating cooling loads is described, and operating costs in seven cities analyzed.

THE air conditioned home has caught on and the day is coming much sooner than we think when, in new homes particularly, it will be the rule rather than the exception. One of the basic questions is: *What will be the preferred energy source for all-year residential air conditioning?* There are three obvious answers to this question.

(1) Electricity (heating produced by electric driven heat pump).
(2) Fuel (cooling produced by absorption refrigeration).
(3) Fuel heating plus electric cooling.

The first of these quickens the pulse of the power sales executive and holds the promise of the all electric home. The second kindles the hope of a steady load for the gas utility. The third seems to please no single supplier of energy and requires that the consumer support two separate energy distribution systems.

Before you begin placing your bets let me say that, in this instance as always, the decision rests with the consumer. Regardless of rationalizations to the contrary *the all-year residential system which will serve the coming demand will be the one that offers the best consumer economics.*

We have made several very extensive studies of these economics considering the three types of systems given above. One of these compared the fuel heating-electric cooling, which hereafter I shall call the "conventional" system, with air source heat pump systems in 22 important cities generally south of the Washington, D. C.-Cincinnati latitude. The other compared the conventional with gas absorption systems in 12 cities and this was extended to cover almost 60 cities on a somewhat approximate basis. Following is a summary of the results.

We consider the initial cost of an all-year residential system to be of primary importance. The reason is that we are no longer dealing with the luxury market. All-year air conditioning has reached the really competitive market of the speculative and merchant builder. In this market you cannot trade much first cost for operating cost differentials. Table 1 shows the way we think system first costs compare in the 3 and 5 ton capacities. The figures are for the complete system including unit, cooling tower, all installation costs and air distribution system.

TABLE 1—SYSTEM FIRST COSTS

Size	Type of System		
	Conventional	Gas Absorption	Heat Pump
	Installed First Cost, Dollars		
3 Ton	2050	2500	2,880
5 Ton	3100	3600	4,150

The figures given for the heat pump include 4 and 8 kw of auxiliary resistance heater capacity in the 3 and 5 hp sizes respectively. Also the cost of the heat pump system applies to one in which the size of the refrigeration mechanism is selected for the cooling load. We have found that the extra cost of a larger unit with less resistance heater capacity cannot be justified by the operating cost saving. For those with air source heat pump application experience the selection gives a "balance point" between 30 and 35F.

It is evident from Table 1 that the conventional system has a considerable first cost advantage. As will be shown later, the annual operating cost of the air source heat pump is also higher in most places. In fact, of the 22 cities analyzed, the heat pump had a lower annual operating cost in only Nashville and Portland, Oregon. In the latter city, this was true only in the 3 hp size. But even in these cities the operating cost differential is too small to justify the extra first cost.

Comparing gas-absorption and conventional systems we find some real operating cost savings in some cities; New Orleans and San Antonio for example. But in only a few of the 57 cities studied will the savings pay back the extra first cost in 3½ years or less. This is the rate we consider the consumer demands.

Under present conditions, then, we must conclude that the conventional system will cost the consumer less to buy and, in the majority of places, less to operate. Therefore, we expect it will be preferred and *will* dominate the home air conditioning boom we are witnessing. Having reached this conclusion let us see what can be done to keep the electrical demand to a minimum and operating hours and annual power company revenue per kw of demand high and this is where my real message begins.

All-year air conditioning of residences, generally in the luxury class, has been done on a limited scale since the

early 1930's. However, about seven years ago it became evident that the mass residential market was about to break and a scientific study of residential cooling loads was begun. It was evident that refrigeration equipment selected by established cooling load estimating methods was invariably too large and operated perhaps two-thirds of the time in even the hottest weather. The reason was obvious. The system was designed to hold a constant temperature and remove the estimated maximum hourly heat gain. At night when the heat gain diminished the equipment would shut off. We knew about the advantages of pre-cooling and storage effect and recognized that a residence had small internal heat gains, wide swings of inward heat flow under the influence of daily temperature swings and solar effects, and generally a large ratio of thermal inertia to heat gains.

So we set out to evaluate the thermal *inertia* or storage effect of typical residences. We did this in Syracuse in June when solar effects are maximum but when daily average temperatures are low enough to permit the homes to be closed, unheated and uncooled, and normally occupied. In half a dozen homes we recorded room air temperatures, wall surface temperatures, outside temperatures and solar intensity.

The results were very instructive and the following conclusions were drawn from this series of tests:

(1) Residences of standard construction that are unheated and uncooled, normally occupied and subjected to maximum outdoor temperature ranges and solar effects have indoor temperature variations of no more than 7 deg F, even on days when the outside temperature varies as much as 33 deg F.

(2) The minimum indoor temperature normally occurs from 5 to 7 a.m. and the maximum between 7 and 10 p.m.

(3) The *mean* daily indoor and outdoor temperatures remain roughly in phase, with the former 5 to 6 deg F higher during June. This difference is required to release the heat gain from solar effects and internal loads.

24-Hr Method

Since we were well aware of the complexities of estimating the *maximum instantaneous* heat gain and since the observed indoor temperature ranges seemed capable of acceptance during the cooling season, a new concept of residential cooling load estimating was proposed. It was suggested that:

> *A residence which is refrigerated at a rate corresponding to the 24-hour heat gain, computed for the peak summer day, would exhibit indoor temperature variations like those of the unheated and uncooled test residences and that this size of plant is the smallest that might safely be applied.*

This statement is the basis of what has been called the "24-hour estimating method" for selecting summer air conditioning equipment capacities. The method assumes the optimum comfort temperature of 74 to 75F as the mean indoor temperature and accepts a maximum variation in hottest weather of 6 to 7 deg F. The thermostat is set at 72 to 73F. This temperature occurs early in the morning 5 to 7 a.m. On very hot days the temperature slowly rises to about 78F in the evening. The equipment operates almost continuously. The question might be raised as to whether such conditions are acceptable. In the last two years we have proved to our satisfaction that they are.

E. P. Palmatier is at present director of research for Carrier Corp. He received his B. S. in mechanical engineering from Stevens Institute of Technology in 1932 and spent the next two years acquiring an M. S. in mechanical engineering from Harvard University while teaching thermodynamics there part time. From 1934 to 1939, Mr. Palmatier did application and development engineering for Carrier Corp; from 1939 to 1942, he was a sales engineer in Carrier's New York office. After joining the Curtis Wright Corp. for the next three years in the capacity of research project engineer, Mr. Palmatier returned to Carrier in 1945 to act first as assistant to W. H. Carrier, then as research section head, air conditioning, prior to his present position.

Some positive arguments and precedent can be established in favor of a variable temperature. In the first place, many people intentionally lower temperature at night during the heating season for reasons of comfort and fuel economy. Some people have indicated that a cool temperature upon arising in the morning is invigorating while at night after the body tires a somewhat warmer temperature is preferred. Of course maximum temperature variations occur only on the hottest days when slightly warm inside temperatures still provide a delightful contrast.

Advantages

Actually these statements should be considered in the light of the following advantages which can be demonstrated quite easily:

(1) The cooling equipment is smaller, less costly, requires less space.

(2) Air quantities are less, approaching those required for heating, and ductwork is smaller and costs less.

(3) Lower humidities are maintained because of more continuous operation of the refrigeration unit.

(4) More continuous running reduces starting and stopping noise.

(5) There is some evidence that more continuous operation of the smaller equipment produces more refrigeration per kw. In the case of larger units that cycle more often, the starting inrush and the initial period before full refrigeration capacity is produced apparenty result in wasted power.

(6) Load factor and power used per kw of demand is increased substantially.

The 24-hour cooling load estimating method can be reduced to a standard calculation form and this has been done by my company. Factors given in the form[1] for calculating heat gain are derived from standard data but are average values obtained by integrating hourly heat gains and dividing by 24. Factors for sunlit walls and roofs reflect the difference in outside surface temperature of light and dark color and are derived from the 24-hour mean sol-air temperature. The same is true for sunlit roofs. The effect of shading by roof overhangs on solar gains through glass and walls is included.

The factors apply for a *mean* room dry bulb of 75F. Only sensible heat gain is computed and the total refrigeration required is found by dividing by 0.75 which we have found is the normal ratio of sensible heat to the total including moisture removal (latent heat).

[1]Carrier form 38C25.

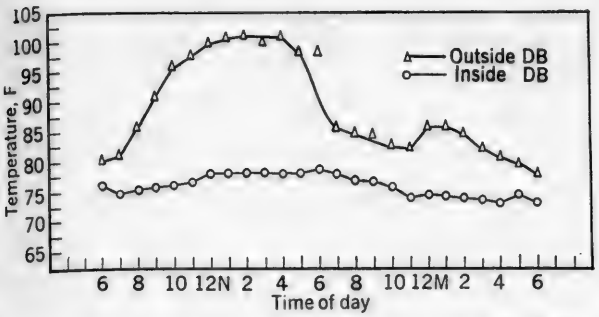

Fig. 1. Hourly temperature record, summer cooling of a Dallas home.

It is important to point out that the estimate is made room by room and, since the heat gains are averages for the day, a logical division of total air quantity is achieved. Other methods that attempt an instantaneous load estimate at some specific hour give no logical solution to this problem.

As I have said this method has been checked by field application for two years. Considerable detailed performance data were gathered on two residences; one in New Orleans and one in Dallas. The weather in Dallas provided the acid test. There were 24 days in succession when our records showed an outdoor temperature of 100F or higher. The heat removed from the house was determined by substracting the power input to the compressor from the measured heat rejection at the refrigerant condenser. For ⅓ of the test period the measured heat removal and value predicted by the 24-hour estimating method checked within the limits of accuracy of the instrumentation. The remaining ⅔ of the data were scattered within ± 5% of the predicted value of heat gain.

Actually this degree of consistency is not surprising. The estimate predicted almost exactly a 3-ton load and a 3-ton unit was installed. During the test period the weather was consistently near peak conditions. The least operating hours during any one day (5:30 a.m. to 5:30 a.m.) was 20 and for 4 successive days the refrigeration operated continuously.

Fig. 1 shows a typical temperature record for the Dallas house. Note that the inside temperature shows maximum and minimum locations very similar to those of the unheated and uncooled residence previously mentioned. The outside temperature range is 23.4 deg F while the inside range is 5.4 deg F.

Humidity conditions inside were almost ideal, being in the range from 45 to 55%. The condensate from the cooling coil was metered continuously to arrive at the latent heat fraction of the total load. It averaged 175,000 Btu per day which corresponds to the removal of over 160 lb of water from the house each 24 hours; a rather surprising result.

Energy Consumption

Now let us consider the question of energy consumption. The figures in Tables 2 and 3 are selected from the analytical comparison of first costs and annual operating costs of various 3 and 5 ton residential systems in 22 cities, generally below latitude 39 degrees. The seven cities selected were chosen at random from the 22 to cover the extremes of heating to cooling load ratio from 1.0 to 2.0 and correspond to heating degree days from about 1200 to 4600. Heating loads were computed using the 97½% winter design temperature which is higher than the accepted value in all cities cited and more reasonable for heat pump application. For the conventional system, heating fuel cost

TABLE 2—OPERATING DATA—AIR SOURCE HEAT PUMP

Item	City						
	Phoenix	Jackson-ville	Houston	Atlanta	Dallas	Little Rock	St. Louis
DB Winter Design	25	25	20	10	0	5	0
97-½%	29.3	31	33	22	23	21	3
Degree Days	1,440	1,185	3,115	2,985	2,365	3,010	4,595
Ratio H/C	1.0	1.2	1.35	1.7	1.75	1.8	2.0
3 hp Heat Pump							
Installed Resistance Heating, kw	0	2	0	6	4	6	14
Total Demand, kw	4	6	4	10	8	10	18
kwh Heating	3,074	2,450	3,056	7,746	5,488	8,200	17,004
kwh Cooling	7,256	6,999	6,679	4,014	5,789	4,920	3,633
Total kwh	10,330	9,449	9,735	11,760	11,277	13,120	20,637
kwh/kw Demand	2,583	1,575	2,434	1,176	1,410	1,312	1,147
Total Annual Operating Cost	191	152	175	165	261	223	311
$ Revenue/kw Demand	47.75	25.30	43.75	16.50	32.60	22.30	17.30
5 hp Heat Pump							
Installed Resistance Heating, kw	0	4	2	10	8	12	24
Total Demand, kw	6	10	8	16	14	18	30
kwh Heating	6,017	5,282	6,329	15,280	11,127	16,018	33,325
kwh Cooling	11,960	11,690	11,203	6,755	9,659	8,241	6,145
Total kwh	17,977	16,972	17,532	22,035	20,786	24,259	39,470
kwh/kw Demand	2,996	1,697	2,192	1,377	1,485	1,348	1,316
Total Annual Operating Cost	328	264	341	330	470	391	589
$ Revenue/kw Demand	54.65	26.40	42.60	20.60	33.60	21.70	19.60

is for gas in all cases except Jacksonville where oil is the cheaper fuel. Power and fuel costs correspond to existing residential rates and are arrived at by computing the monthly bills after assigning constant amounts of fuel and power for water heating, lighting, food preparation, etc. to the initial blocks of energy.

were held constant and the degree of insulation was identical. However, the characteristic size of the house was allowed to change so that it matched the cooling capacity exactly in each of the cities in question. Hence, in any one city the size of house is the same for heat pump and conventional system since the equipment has essentially the same cooling capacity. But the house size varies from one city to another depending on the cooling design conditions.

TABLE 3—OPERATING DATA—ELECTRIC COOLING, FUEL HEATING

Item	City						
	Phoenix	Jackson-ville	Houston	Atlanta	Dallas	Little Rock	St. Louis
3 hp Conventional							
kw Demand	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Cooling kwh	5,903	6,549	6,297	3,920	5,265	4,646	3,417
Heating kwh	93	89	105	246	169	246	380
Total kwh	5,996	6,638	6,402	4,166	5,434	4,892	3,797
kwh/kw Demand	1,715	1,897	1,830	1,190	1,550	1,397	1,086
Cooling Power Cost	107	104	106	54	124	81	53
Heating Power Cost	3	2	3	5	7	6	9
Total Power Cost	110	106	109	59	131	87	62
Fuel Cost	18	35	23	54	34	37	91
Total Annual Operating Cost	128	141	132	113	165	124	153
$/kw Demand	31.40	30.30	31.20	16.90	37.40	24.70	17.75
5 hp Conventional							
kw Demand	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Cooling kwh	9,317	10,356	9,963	6,166	8,353	7,358	5,402
Heating kwh	277	284	297	710	495	710	1,115
Total kwh	9,594	10,640	10,260	6,876	8,848	8,068	6,517
kwh/kw Demand	1,743	1,937	1,870	1,250	1,610	1,467	1,184
Cooling Power Cost	169	161	178	92	190	122	82
Heating Power Cost	7	6	9	13	19	18	22
Total Power Cost	176	167	187	105	209	140	104
Fuel Cost	33	65	38	84	59	55	156
Total Annual Operating Cost	209	232	225	189	268	195	260
$/kw Demand	32.00	30.40	34.00	19.10	38.00	25.40	18.90

Table 2 shows certain design information applying to the various cities together with annual power consumption and operating costs for 3 and 5 hp air source heat pump equipment. Table 3 gives similar information for conventional fuel heating-electric cooling equipment. Table 4 summarizes the information in Tables 2 and 3 in such a way that direct comparisons can be made between the electric consumption per kilowatt of demand and total annual operating cost. It should be noted that in developing the figures shown in these tables the 24-hour estimating method was used to define the cooling load. All houses were assumed to have essentially the same heat gain characteristics, that is the window area was assumed to be the same percentage of the total wall area, orientation was the same, relative dimensions

It will be noted that the kwh per kw of demand for the heat pump is very sensitive to the auxiliary resistance heating capacity required. In Phoenix and Houston, where no resistance heat is included in the system, the kwh per kw is very favorable for the heat pump. In the other cities there is little to choose between heat pump and conventional system. In all cities the consumer obviously would pay more to operate the heat pump system.

TABLE 4—SUMMARY

City	3 hp				5 hp			
	kwh/kw Demand		Annual Op. Cost		kwh/kw Demand		Annual Op. Cost	
	H.P.	Conv.	H.P.	Conv.	H.P.	Conv.	H.P.	Conv.
Phoenix	2,583	1,715	$191	$128	2,996	1,743	$328	$209
Jackson-ville	1,575	1,897	152	141	1,697	1,937	264	232
Houston	2,434	1,830	175	132	2,922	1,870	341	225
Atlanta	1,176	1,190	165	113	1,377	1,250	330	189
Dallas	1,410	1,550	261	165	1,485	1,610	470	268
Little Rock	1,312	1,397	223	124	1,348	1,467	391	195
St. Louis	1,147	1,086	311	153	1,316	1,184	589	260

Summary

(1) A rapid growth of the all-year residential business is to be expected. This will place great demands on both the manufacturer of equipment and the supplier of energy for its operation.

(2) Much as our reason would dictate equipment that requires a single kind of energy (electricity or gas), the design must be dictated by consumer economics.

(3) At the present time the conventional residential system combining fuel heating and electric cooling costs the consumer less to own and operate.

(4) An application method is available for predicting the smallest cooling capacity that may safely be applied to a residence. This method is based on the 24-hour heat gain and takes advantage of the thermal capacity of the structure.

(5) Cooling equipment so selected is most economical.

Protecting the Trap Seal

HARRY E. GOSS

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The floor drain trap is an effective means for preventing sewer gas from backing into a building. However, under certain conditions, the seal may be lost through evaporation. A means for automatically priming such traps is illustrated and described.

As a result of research and experimentation, much has been done to improve plumbing sanitation. It has become possible to design plumbing systems so that fixture traps under normal usage will maintain adequate seal and consequent protection against sewer gas and vermin entering occupied buildings.

Modern codes provide for this protection, but unfortunately, even though the waste and vent lines in a plumbing system may be properly designed and installed, it is important and necessary that all fixture and floor drain traps be used at normal intervals or periodically supplied with water to replenish the liquid lost by evaporation. The greatest danger from loss of trap seal, for this reason, occurs where drains are located in areas of a building where surrounding floors are not washed periodically, and where there is no regularly used water outlet which could replenish the much needed trap seal. Instances of this kind most commonly occur in storage warehouses, basements of store buildings, and in basements of various types of public buildings.

While there are several ways in which the liquid seal of fixture and floor drain traps may be lost, such as by siphonage, stack pressure differential and leakage, this discussion relates only to the loss of floor drain trap seal by evaporation.

Health Hazard Has Increased

Sewer gas, which has always been dangerous to health, is of a much more dangerous type now than it was forty or fifty years ago. It is now a potential fire hazard due to the large quantities of oil and volatile liquids that are being dumped daily into sewer systems. This is the inevitable result of the greatly increased use of automobiles and trucks. Through ignorance on the part of automobile and truck owners, operators of filling stations and garages, great quantities of combustible and explosive liquids find their way into the sewers. Also, the great and increasing number of waste food grinders adds its quota to the generation of explosive and toxic sewer gases within our public sewer systems. Sewer systems are generally overloaded which increases the concentration of gases, and the necessity of keeping under control this danger to health and property.

Explosions of sewer gas in the sewer mains themselves are a common occurrence in San Francisco. Manhole covers have been blown 20 ft or more into the air at times. These explosions, and others, such as the recent one in Cleveland, can be touched off at any moment by an automobile back fire, a discarded lighted match, or by a spark caused from static electricity.

Experience at Reno

Sewer gas can escape into buildings through unfilled traps. A striking example of this occurred in Reno, Nevada, in 1948. At that time, a fire broke out in a store building and was not controlled until it had burned three one-story business buildings. At the height of the fire, four firemen entered a building adjoining that where the fire originated just as the flames ate through into the basement. Immediately, there was a terrific explosion which completely destroyed the building, killing the four firemen. An investigation revealed that a floor drain trap in the basement of the building which exploded had been unused for years. It was also found that the sewer gas was highly explosive.

Reno is located on the main traffic lane from the East to the Pacific Coast. Every year, tens of thousands of tourists drive through Reno, which probably has more garages and filling stations per capita than any city in the world. The unusual quantities of used oil dumped into the Reno sewers made it necessary for the city to close down and pump out the sewage treatment plant every six months because of the effects the oil had on the bacteriological action.

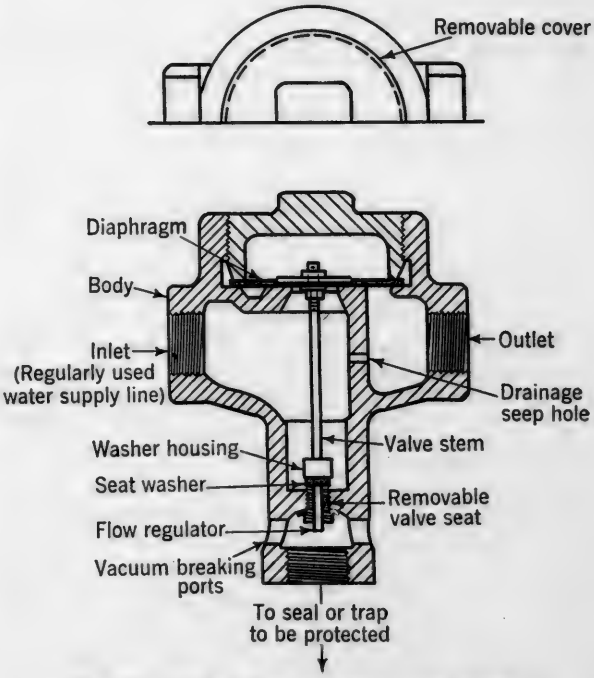


Fig. 1. Details of an automatic trap primer.

This article is based on a talk presented for the 1953 Refresher Course of the American Society of Sanitary Engineering.

Following the disastrous fire and explosion, the city passed an ordinance prohibiting the disposal of oil into plumbing fixtures or floor drains. They also required that public garages or filling stations having facilities for washing and servicing automobiles within the city, to have and use drains of the oil intercepting type. Since the adoption of this ordinance and the replacement of garage and filling station floor drains with the oil intercepting type, there have been no interruptions in the operation of the sewage treatment plant.

Although floor drain traps are designed to function properly, they must be used regularly so that the water seal will not be lost through evaporation. If use is discontinued, the fixture trap should be removed and the waste plugged. If a floor drain is installed where a normal supply of water is not available, an automatic trap primer should be used. This device should be installed in a water line supplying a regularly used fixture, such as a water closet, a sink, or a lavatory.

Description of a Trap Primer

There are several automatic trap primers on the market. While the one illustrated in Fig. 1 is of the diaphragm type, they are also made in the piston or plunger type. Any normal flow of water through the supply line in which the primer is installed causes the main valve to open. The lifting of the main valve automatically opens the lower or waste valve, allowing a small quantity of water to be discharged into the floor drain trap. Leakage through a faucet or closet tank ball cock is usually not of sufficient volume to cause the trap primer to open.

There is a metering pin in the waste valve to limit the flow and to prevent clogging. There is also a removable seat on the waste valve. A drain hole is provided so that the fixture supply pipe can be drained if necessary to prevent freezing. There are no close fitting parts in this primer to lime up in hard water. This sometimes happens with the piston type primers. Two vent holes larger in area than the supply line running to the floor drain are provided to prevent any possibility of back siphonage of water from the floor drain into the water supply.

An automatic primer is the only safe protection against sewer gas, vermin, and rodents gaining access to a building by way of dry floor drain traps. Floor drains with a mechanical seal are not reliable and traps with backwater valves of the float ball type are generally tight against backwater pressure, but are in a wide open position if the trap is dry.

The need for automatic primers where floor drain traps are subject to evaporation, has long been recognized. The Report of the Coordinating Committee for a National Code requires automatic trap primers, when other permanent water seals are not assured. The Western Plumbing Officials Association "Uniform Plumbing Code", and most other codes, have the same requirement. It becomes more necessary that the seal of all traps within buildings be protected from evaporation or loss from any cause. For some time we have been discontinuing the use of house traps.

The rate of evaporation from trap seals varies with temperature and humidity. Trap seals close to vents usually evaporate faster than those farther away. It has also been found that water in an old trap with interior rusted or covered with a deposit coating will evaporate faster than water in a new trap. Pieces of string or cloth partially submerged in the water of a trap greatly accelerate the rate of evaporation.

There are very few plumbers or plumbing inspectors who at some time in their career have not been called upon to locate in a building the source of escaping sewer gas. This gas was in evidence because of odor, vermin, or insects. In many cases, following an investigation, they found that a dry floor drain or fixture trap was responsible for the trouble.

During housing shortages in some of the larger cities, basements were converted into living quarters. Rugs were laid over floor drains and dry traps went unnoticed until the rugs were almost devoured by vermin from the sewer.

A leading bank in one of our larger cities converted a basement into a safe deposit department, leaving a dry floor drain to pour sewer gas into the banking room above. Sickness among the employees almost closed this bank before the cause was discovered.

Vermiculite Floor Cuts Brooder House Heating Costs

The combination of electric heat and vermiculite concrete floors provides a brooder house heating system considerably cheaper than other methods to operate according to a farm electrification expert.

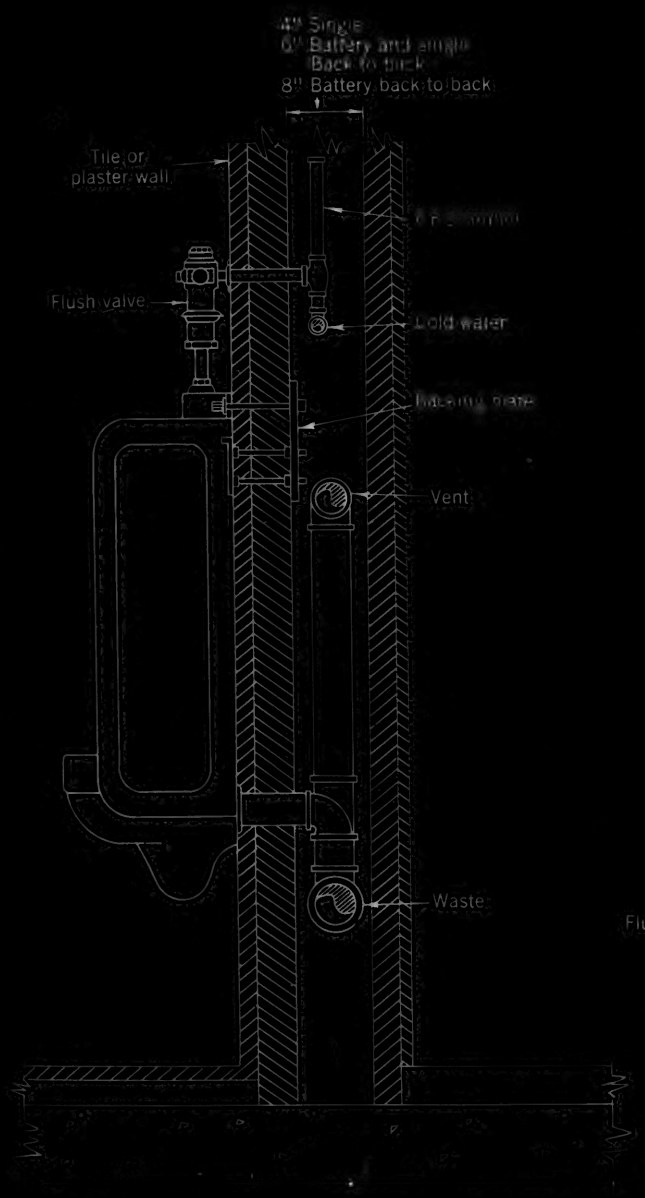
This system costs from ½ to 1 kwh per bird brooded depending upon climatic conditions. Such a system guarantees some protection to the operator in case of power outages, due to the floor retaining its heat for a long period of time after the current has been disrupted, according to Mardis O. Whithed, Rural Supervisor for the Atlantic City Electric Company, Atlantic City, N. J.

This public utility, which serves Southern New Jersey and Atlantic City, has approximately 8,000 farms in its system. The utility has supervised the installation of over 300 brooders of this type in poultry houses in its service area, and the company advises poultry raisers on brooder installations. Complete plans for the construction of brooders are supplied.

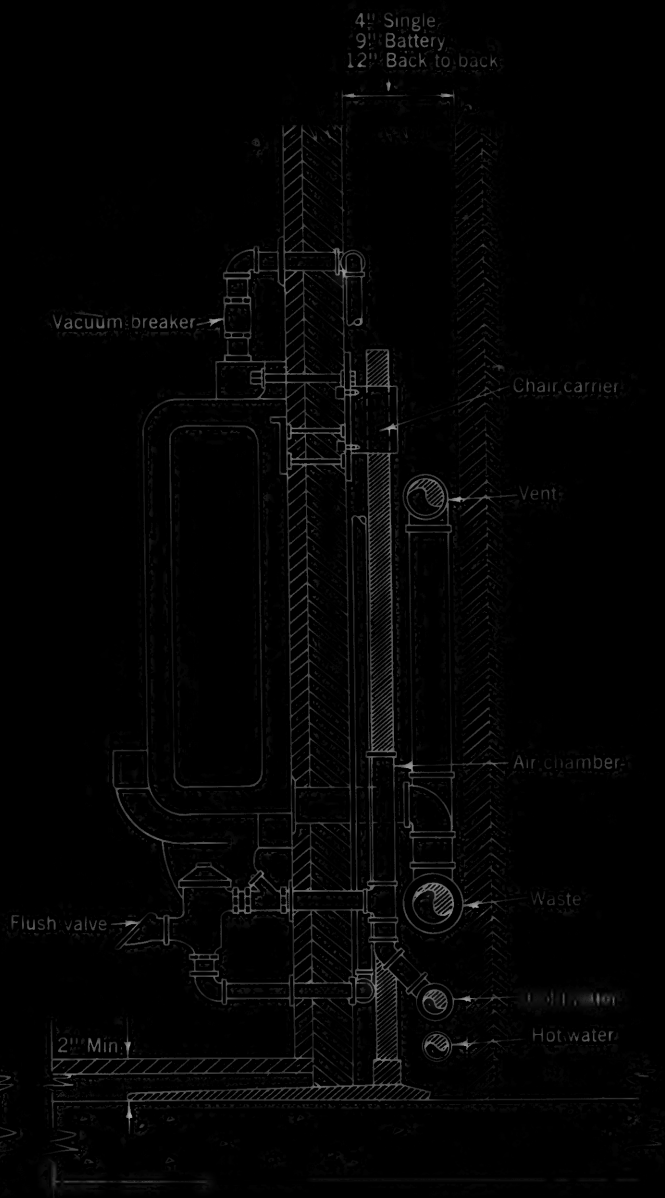
Recommendation of radiant electric heat coils and vermiculite concrete results from the company's comprehensive research program. It found, stated Mr. Whithed, that these materials provide the cheapest heating, while offering fire protection and almost eliminating maintenance costs.

Whithed's method is to lay a five to six-inch thick base of drainage material, such as stone, gravel, or cinders, on the ground. A water proofing membrane paper is then applied, and the vermiculite concrete slab three or four inches thick, is poured over it. The electric heating coils are placed evenly over the slab about 2½ inches apart, and covered with a one-inch thick topping of sand concrete.

PIPING FOR WALL HUNG URINALS



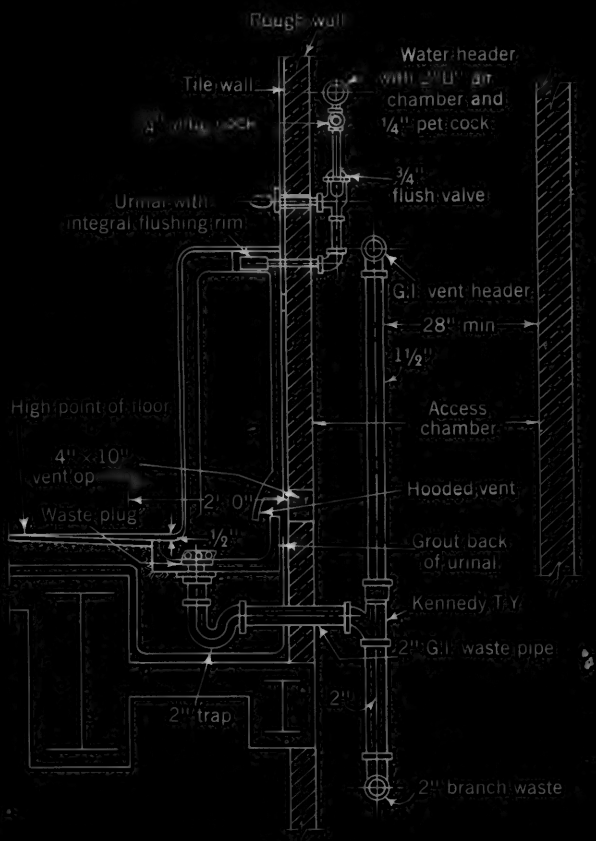
WALL HUNG URINAL WITH HAND OPERATED FLUSH VALVE



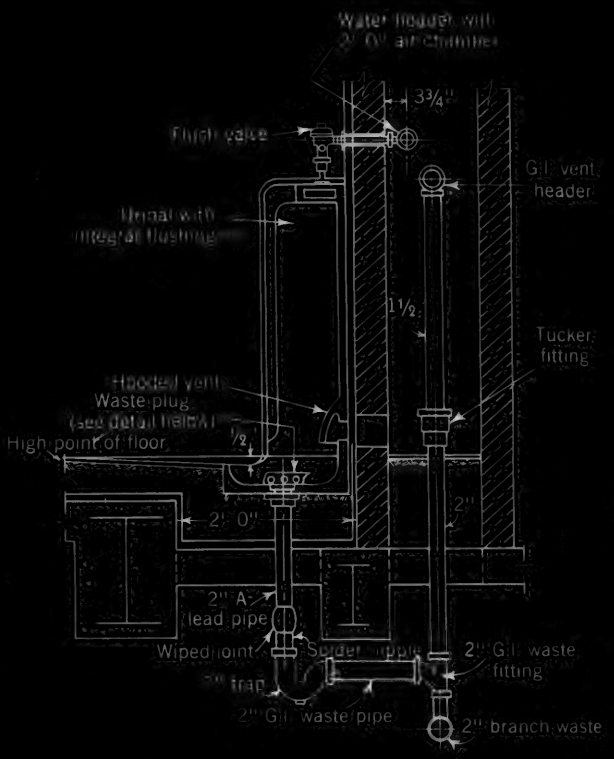
WALL HUNG URINAL WITH FOOT OPERATED FLUSH VALVE

HEATING AND VENTILATING'S DETAIL SHEET

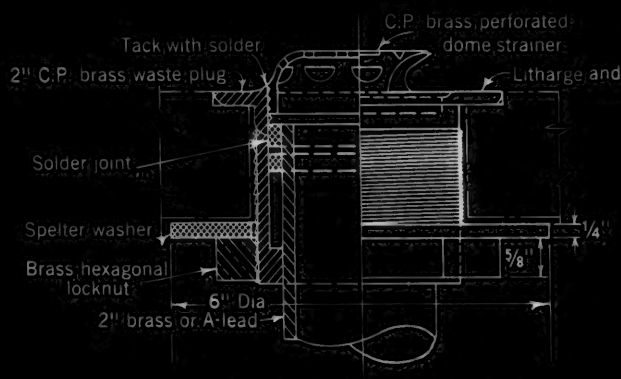
PIPING FOR STALL URINALS



SECTION SHOWING TRAP ABOVE SLAB AND CONCEALED FLUSH VALVE



SECTION SHOWING TRAP BELOW SLAB AND EXPOSED FLUSH VALVE



DETAIL OF URINAL WASTE PLUG

PIPING HOOKUPS THROUGH THE COOPERATION OF W.C. KNIGHT, NEW YORK, N.Y., AND SYSKA & HENNESSY, INC., NEW YORK, N.Y.

How Higher Courts Have Ruled

LEO T. PARKER

Attorney at Law, Cincinnati, Ohio

Brief reviews of recent higher court decisions of interest to heating contractors and the buyers and sellers of heating equipment. They are presented as a guide to prevent expensive litigation.

THE higher courts rendered several unusual and outstanding decisions affecting heating contractors, buyers and sellers of heating supplies, and equipment that are of interest. Many of these legal controversies show a surprising lack of good legal judgment on the part of litigants, including heating contractors. Many other decisions illustrate an astounding lack of good judgment on the part of contractors preparing to win expensive law suits. These various law suits are briefly reviewed. Readers will do well to clip and file this article for future reference, as the new higher court decisions cited can be advantageously used by readers and their lawyers to win future unavoidable law suits.

The Courts Are Fair

According to a late higher court decision modern higher courts are fair and reasonable in their decisions and a seller who breaches a sale contract is liable only for the actual damages sustained by the purchaser as a result of the seller's breach.

For example, in Brenne v. Reddick, 57 N. W. (2d) 719, it was shown that a salesman for a company which distributed stoves and other appliances called on a dealer and prospective purchaser, named Brenne, who purchased from the salesman 20 portable air conditioners at a cost of $700, and 20 oil burners at a cost of $1,180, and signed a contract. The stoves and air conditioners were delivered to Brenne, by a trucking concern.

In subsequent litigation, Brenne testified that the salesman had made certain oral misrepresentations, namely, that if Brenne would purchase the 20 air conditioning units and the 20 oil burners, that a representative of the company would contact Brenne within three or four days and would remain with him for a period of 30 days for the purpose of instructing him how to sell the units, and earn a nice profit. Brenne proved that no representative of the company arrived to assist him to sell the units. Brenne asked the court to allow him damages of $4,230 determined as follows: A loss of profit promised by the salesman in the amount of $360; loss of $1,880 paid to the seller for the purchase of the units, and for the loss of $2,000 which was the average profit made by Brenne at his regular occupation, which occupation was curtailed in order that he would be ready to serve the defendants, and sell the units.

The higher court considered all these various allegations and admitted that the company's salesman had breached his oral promise to send a man to assist Brenne to sell the appliances at a profit. However, the higher court awarded Brenne only $590 damages because the testimony showed that he lost no money on the air conditioning units. With respect to the oil heaters the court explained that Brenne paid $1,180.00 for twenty of them. This works out to $59.00 each. Further testimony showed that the salesman had promised Brenne to assist him to sell the heaters at $99.50 each. In awarding Brenne $590 damages the court said:

"We have an established actual retail value of $29.50 per unit for which by fraudulent misrepresentations respondent (Brenne) was induced to pay $59.00, and that in bulk quantities. The difference per unit is $29.50 and for the twenty units is $590.00. No loss or profit or other damage claimed by respondent was supported by proof."

Hence, as Brenne failed to prove that actually he sustained more than $590 damages the higher court refused to allow the $4,230.00 damages for which Brenne sued.

Must Follow State Laws

According to a late higher court decision, combination bids on public works are not acceptable, where a state law requires separate bids. This is so although an authorized architect promises that combination bids are acceptable.

For example, in State v. Board, 58 N. W. (2d) 70, the testimony showed facts, as follows: A state law provides that county and municipal boards must let public work by contract to the lowest responsible bidder. This court held that under this state statute the county could not accept a combination bid covering both heating and plumbing on a county building project. This court said:

"The question raised is whether the county under such statute may accept a combination bid, such as was submitted by Grudem Brothers Company covering both the heating and plumbing on a county building project. To have awarded the contract for the plumbing and heating in the instant case to Grudem Brothers Company upon their combination bid, when all the other bidders submitted separate bids for the plumbing and separate bids for the heating would be an act of 'favortism.'"

This decision was rendered in the face of arguments that the county was not hurt by the submission of the combination bid, but, on the contrary, it stood to benefit because of it being lower than the aggregate amount of the lowest separate bid for the plumbing plus the lowest separate bid for the heating. Also, the testimony showed that the Grudem Brothers Company had privately contacted the county's architect who informed it that combination bids were acceptable. Nevertheless, the higher court held the combination bid invalid, saying:

"It is therefore our conclusion that the act of Grudem Brothers Company in submitting a combination bid was unauthorized and that the acceptance thereof would violate the statute."

Estimate On Job

Considerable discussion has arisen from time to time over the legal question: "If a heating contractor submits

a bid to do certain work and to furnish certain materials at an estimated price, is the contractor expected by law to keep the final cost below the estimate?"

According to a higher court decision, the answer is, no.

For instance, in Beeler Heating Company v. Miller, 254 S. W. (2d) 987, the testimony showed that a heating contractor submitted to a property owner a bid to do all the heating work in a new building for $4,000. The bid contained this notation: "All plumbing and heating installed, approximately $4,000."

The bid submitted by the Beeler Heating Company contained an itemization of materials and clearly provided that all plumbing and heating would be installed for approximately $4,000.

After starting on the work the contractor realized that he could not at a profit complete the job for that price, and he refused to complete the job unless the property owner paid an additional sum.

In subsequent litigation the higher court held the contractor was not obligated to complete the job for $4,000, and said:

"An estimate does not pretend to be based on absolute calculations but is exactly what the word means, 'an estimate'. To make an estimate, ordinarily means 'to calculate roughly, or to form an opinion as to amount from imperfect data.' "

Therefore, it is quite apparent that if a heating contractor submits an estimate of the cost of performing definite work, he may considerably increase the final cost to the property owner above the original estimate. If the property owner refuses to pay the final bill, the contractor can file suit and collect the full amount of his final bill. On the other hand, other courts have held that if a contractor promises that he will complete a job for not more than a specified amount, he is compelled to comply with his promise.

In one case, for instance, a heating contractor signed a contract giving an estimate of "between $4,000 and $4,500" for completing a job. The higher court held that the contractor could not collect more than $4,500, although he lost money at this price.

For comparison see Palmer v. Albanese, 79 Atl. (2d) 699. Here it was shown that a contractor made a contract with a property owner whereby the contractor agreed to furnish labor and material in the installation of certain plumbing. The property owner agreed to pay the contractor $1,000 bonus if he would complete the job within 30 days from date specified.

The contractor proceeded with the work, but the job was not quite completed within the specified 30 days because of a situation which made it impossible for the contractor to finish the job.

The property owner refused to pay the $1,000 bonus and the contractor sued to recover $245, the amount he expended completing the job according to the original contract.

It is interesting to note that the higher court held in favor of the property owner, and said:

"The rule applicable to contracts generally is that an absolute completion of performance must be proved before the right to payment can be enforced."

Therefore, a contractor is legally obligated to complete a job within the time specified in a bonus contract, otherwise he is not entitled to a bonus. Moreover, this law is applicable although the property owner offered the bonus to induce the contractor, who intended or already had breached his contract, to complete a job.

Contract Relieves Seller

Recently a higher court held a seller relieved absolutely from liability for breach of a contract which contains a clause that the seller "assumes no liability" for consequential damages.

For illustration, in Des Oven Company v. Rauenhorst, 40 N. W. (2d) 73, the testimony showed facts, as follows: A manufacturer entered into a written contract in which it sold to a purchaser a "dryer" to be used for processing food. The purchase price was $4,356. The dryer is a metal cabinet 20 ft long, 8½ ft wide, and 11½ ft high. In one end of the cabinet is an oil burner and a combustion unit. At the other end is a fan operated by a 25 h.p. motor. In the burner combustion unit oil is burned, mixed with air, and then forced toward the fan which forces the heated mixture out of the dryer into ducts where it travels to bins, for drying corn.

The dryer was warranted in the written contract to produce sufficient hot air having a temperature of 110F when the outside temperature was not less than 40F to dry during 24 hours, 1,500 bushels of corn having not more than 26 per cent moisture.

The written contract also contained this clause: "Contractor assumes no liability for consequential damages of any kind which result from the use or misuse of the equipment."

In subsequent suit the testimony showed that because of the excessive amount of moisture in the corn to be dried and also because the air ducts had some right-angle bends which interfered with the travel of the heated air, the purchaser was able to dry only about 300 bushels of corn in 24 hours instead of 1,500 bushels specified in the written guarantee. As a consequence, almost 3,400 bushels of corn germinated, causing damage to the purchaser in the sum of $16,910.

The purchaser sued the manufacturer for damages amounting to $38,000, and the manufacturer sued the purchaser to recover $4,185.50, the unpaid balance of the purchase price of the corn dryer.

It is interesting to observe that the higher court held that the purchaser must pay for the dryer and that the manufacturer was not liable for any damages to the purchaser. The court said:

"In the final analysis, the contentions of the parties raise the question, viz.: (1) Whether the clause in contract that plaintiff 'assumes no liability' for consequential damages exonerates it from such liability. . . . The use of the negative—assumes no liability—is indicative of an intention that the party shall not become liable."

Must Prove Damages

Modern higher courts consistently hold that under no circumstances can a dealer in heating supplies recover damages from a seller unless the testimony is positive that the seller breached a valid contract.

For example, in Comstock v. Coronet Company, 245 Pac. (2d) 357, the testimony showed that a heating contractor and wholesaler in plumbing and heating equipment sued a corporation for damages. The contractor claimed that the corporation breached its contract which

gave the contractor the exclusive distribution of its products and including heating supplies in a definite area.

Since the contractor failed to prove the amount of damages he sustained as a result of the corporation's breach, the higher court refused to allow the contractor any damages.

All higher courts refuse to speculate on the amount of damages sustained by a heating contractor or dealer. In other words, to win a suit the contractor must prove the amount of damages or financial losses he sustained as a result of the other contracting party's breach.

Contractor is Liable

A reader asked: "Can a contractor in any way avoid his usual liability for breaching an installation contract, if he proves that it was quite impossible for him to comply with the terms of and fulfill the contract?"

The answer is no, unless the contractor proves that the owner himself did some act which prevented the contractor from fulfilling the terms of the contract.

In other words modern higher courts consistently hold that a contractor is liable in damages to a property owner if he fails to comply with the exact terms of a contract to construct, improve or make installations.

For example, in Crumley v. Walter M. Ballard Corp. 224 Pac. (2d) 455, the testimony showed facts as follows: The owner of a motel gave a contract to a contractor to install a heating and air conditioning system. After the job was completed, the owner sued the contractor for heavy damages claiming that the air conditioning unit would not operate as guaranteed by the contractor.

Although the contractor offered several apparently good excuses, the higher court held the contractor liable to the owner of the motel for $18,500 damages, and said:

"The trial court found as a fact that the failure of the air conditioning system to perform satisfactorily was due to the faulty design and plans supplied by appellant (contractor). Respondent (motel owner) was led by appellant (contractor) to believe that if he proceeded to put in the system designed by appellant, he would get a fully automatic air conditioning system which would perform satisfactorily. He did not get such a system. To get that which was warranted to him, he reasonably and necessarily expended the additional sum of $18,459.55."

For comparison, see Riggs v. Densmore, 80 N. E. (2d) 38. This court explained that a contractor is obligated to comply with the exact terms of his contract, no matter how difficult it is for him to perform. The testimony in this case showed that a contract was in the form of a written proposal or specification, accepted by the property owner, for the installation by the contractor of an oil heating system. The proposal stated: "It is the intent of this specification to cover a complete heating system and have it ready for the use of the owner. We guarantee to heat the house to 70F at all times. . . ."

The owner refused to pay the contractor and the latter filed suit. During the trial the property owner proved that the system when completed by the contractor would not heat the property to 70F during cold weather.

In view of this testimony the lower court refused to order the property owner to pay the contractor any money although the contractor presented to the court many reasons why he found it impossible to comply with his contract. The higher court approved the verdict, and said:

"The judge ruled that the language of the plaintiff (contractor's) specification . . . . bound the plaintiff (contractor) to install a heating system capable of heating to a temperature of seventy degrees. The finding was not inconsistent."

And again see Costanza v. Cannata, 36 So. (2d) 627. Here it was shown that a contractor signed a contract to perform work in accordance with the plans and specifcations. The contractor could not complete the contract on account of unusually heavy rains. The higher court awarded the property owner $9,800 damages. This court said impossibility to perform does not excuse a contractor for a breach.

Validity Of Mechanics Lien

Considerable discussion has arisen from time to time over the legal question: "When and under what circumstances can the contractor of heating equipment or merchandise file a mechanic's lien to secure payment for the merchandise and the cost of its installation?"

According to a late higher court decision, the answer is: Only when the merchandise or equipment is permanently attached to real estate.

For example, in Cascade Company v. Associated Creditors, Inc. 224 Pac. (2d) 146, a contractor filed a suit for a mechanic's lien to secure payment for certain equipment which he had installed.

The higher court refused to hold that the contractor could have a valid mechanic's lien to secure payment for the money due, because the equipment was not permanently attached to the real property, and said:

"Obviously equipment placed upon the platform constructed as it was, were not "fixtures" so as to make them real estate and lienable."

For comparison, see Butte Company v. Brett, 257 P. 478,480. In this case the higher court held that any equipment placed temporarily on land remains a chattel and therefore is not real estate on which a valid mechanic's lien may be filed.

Therefore, the law is established as follows: If heating equipment is placed on land to permanently improve it, and make it more valuable, it is generally deemed a fixture, on which a lien will attach, but if it is so attached that it does not enhance the value of the land, it remains a chattel on which a lien will not attach.

Interest Allowed Contractor

According to a late higher court decision a heating contractor is entitled to legal interest on money due from a property owner on a contract from the day an inspector issues a "certificate of completion".

In Schroeter Plumbing and Heating Company v. Newson, 41 So. (2d) 697, it is shown that without justification the property owner refused to pay a contractor on completion of the contracted work.

In subsequent litigation, the higher court ordered the property owner to pay the full contract price plus legal interest from the date a certificate was issued by the city inspector.

The higher court held that the certificate proved the date that the work was satisfactorily completed, and explained that under all circumstances a debtor must pay legal interest to a creditor from the date that a debt is proven.

Characteristics of Commercial Air Cleaners

MELVIN W. FIRST AND LESLIE SILVERMAN

Harvard School of Public Health, Department of Industrial Hygiene, Boston, Mass.

Important features of commercial air cleaners in common use are grouped for easy comparision in an extensive table.

THE purpose of this tabulation is to compare systematically important features of the broad classes of commercial air cleaners now in common use. No attempt has been made to include all known collectors, because some are not widely applied nor generally accepted, and others, by far the majority, are simply variants of those included.

The capacity of collectors, as listed, indicates only the usual size range. In most cases desired capacity may be obtained by similar units in parallel. Air velocities through the collectors indicate upper and lower limits of good practice and should not be exceeded without a study of individual problems.

Limiting Values

Pressure loss is only generally indicated since it is affected by numerous operating factors. For example, velocity, cleanliness of the cloth and aerosol characteristics affect the resistance of a bag filter. For comparison the upper and lower limits of usual practice have been given.

CHARACTERISTICS OF COMMERCIAL AIR CLEANERS

Type of Collector	Separating Forces	Capacity CFM $\times 10^3$	Air Velocity FPM	Pressure Loss, Inches Water Gage	Optimum Dust Loadings, Gr Per Cu Ft	Installed $ Cost per CFM of Rated Capacity	Approx. Efficiency Less Than μ
Dry Mechanical Collectors							
Settling Chambers	Gravitational	0.5-10.0	25-75	0.2-0.5	10+	0.05	<10
Baffle Chambers	Inertial	0.5-10.0	1000-1500	0.5-1.0	10+	0.05	<10
Large Dia. Cyclones	Centrifugal	1-10	Entry velocity 2000-4000	0.5-2.5	1+	0.10-0.25	<10
Small Dia. Cyclones	Centrifugal	0.03-0.1 per unit. Collectors contain 4-500 units	Entry velocity 2000-4000	2.0-4.5	0.5-10	0.25-0.50	<10
Mechanical-Centrifugal Collectors	Centrifugal	0.5-10	Entry velocity 2500-4000	....	1-10	0.20-0.35	<10
Wet Collectors							
Spray Washer	Impaction	0.5-100	200-500	0.1-0.2	<1	0.10-0.20	<10
Wetted Baffle Towers	Inertial Impaction	0.5-5	200-500	0.20-0.75	0.1-2	0.20-0.40	<10
Wetted Packed Towers	Inertial Impaction	0.5-5	200-500	1-10	<1	0.40-0.80	<10

Dr. Melvin W. First, a consulting and research engineer in the field of gas cleaning and air pollution, received a B. S. in Public Health degree from Massachusetts Institute of Technology in 1936. This was followed in 1947 by an M. S. in Sanitary Engineering degree from Harvard University and three years later by a Sc. D. in Industrial Hygiene Engineering from Harvard University. He served as industrial hygiene engineer with the Detroit Department of Health and later with the Michigan State Health Department. For a number of years he was associated with the Air Cleaning Laboratory of the Harvard School of Public Health.

Dr. Leslie Silverman is a M. E. graduate of the University of Illinois. He received his M. S. in Mechanical Engineering from Rutgers University, and both his S. M. and Sc. D. in Industrial Hygiene Engineering from Harvard. He has been at Harvard since 1937 and at present is Associate Professor of Industrial Hygiene Engineering in the Harvard School of Public Health, and Division of Applied Science, Graduate School of Arts and Sciences.

He is consultant to the Army Chemical Corps, Argonne National Laboratory, Los Alamos Scientific Laboratory, Mine Safety Appliances Company, General Electric Company, Air Reduction Company and Vanadium Corporation of America. At present he is engaged in research on air cleaning methods for the U. S. Atomic Energy Commission.

Dr. Silverman is a member of ASME, American Industrial Hygiene Association, American Association for the Advancement of Science, American Society for Engineering Education, Tau Beta Pi and Sigma Xi.

where upper and lower resistance limits show a large spread (i.e. greater than three-fold) efficiency and pressure loss will vary proportionally.

Because aerosols vary, efficiency ratings cover a wide range for each size classification. Values greater than those indicated in the table may be obtained under favorable circumstances. The lower figure, we believe, can be taken as a safe guide to the poorest expected operating conditions.

Costs reflect the latest information available to us, but can only be relied on to indicate comparative purchase and installation price. When choosing between collectors those having equivalent performance in terms of operating costs as well as initial outlay should be considered. Utility costs vary widely in different sections of the country, hence estimates of operating costs are not presented.

Service life figures are minimum estimates. Abrasive properties of dusts, corrosiveness of gases and mists, and attention to collector maintenance are all factors in service life. These factors can be more adequately appraised only when there are details of a proposed installation.

CHARACTERISTICS OF COMMERCIAL AIR CLEANERS

Approximate Particle Size Efficiency—% by Weight			Usual Service Life, Years	Resistance to Heat, Corrosion, etc.	Miscellaneous Notes
Less Than 1 μ	1-5 μ	5-10 μ			
<10	<10	<10*	10-20	Corrosion and heat resistant materials available.	Very bulky for handling large volumes of gas.
<10	<10	10-40‡	10-20	Corrosion and heat resistant materials available.	Re-entrainment of dust at velocities great enough to produce large inertial forces.
<10	<10	40-75	10-20	Corrosion and heat resistant materials available. Rubber lining for abrasive dusts.	Internal vanes, baffles and spacers or dust skimming devices do not appear to materially improve collection efficiency.
<10	10-40	75-95	5-20	Corrosion and heat resistant materials available, subject to abrasion.	Uniform distribution of air and dust to each unit difficult in large banks of collectors. Tendency to plug at very high dust loadings.
<10	10-20	60-80	5-20	Corrosion and heat resistant materials available, subject to abrasion.	Fan and dust collector in single unit. Compact. Not recommended for materials that cake and stick on blades thereby putting rotor out of balance.
<10	10-20	20-40	10-20	Corrosion resistant materials available.	May be used for humidification and to cool hot gases.
<10	10-20	20-40	5-20	Corrosion resistant materials available. Hot gases cooled in apparatus.	Baffle towers in which air is blown through water cascades are somewhat more efficient for small particles, but pressure drop is much higher than indicated.
<10	20-60	60-90	5-20	Corrosion resistant materials available. Hot gases cooled in apparatus.	Efficiency depends on size of packing. Not recommended for solid particulates due to rapid plugging of packing.

CHARACTERISTICS OF COMMERCIAL AIR CLEANERS

Type of Collector	Separating Forces	Capacity CFM $\times 10^3$	Air Velocity FPM	Pressure Loss, Inches Water Gage	Optimum Dust Loadings, Gr Per Cu Ft	Installed $ Cost per CFM of Rated Capacity	Ap Eff Les Than μ
Wetted Cyclones	Impaction Centrifugal	0.5-5	Entry velocity 2000-3500	1-5	1-10	0.25-0.40	<10
Scrubber or Disintegrator	Diffusion, Impaction, Centrifugal	0.1-1.0	....	10 HP/1000 CFM	<1	1.0-2.0	80-9
Fabric Filters							
Bag and Screen Cloth Filters (Intermittent Cleaning)	Diffusion Inertial Electrostatic Sieving	0.05-200	2-5 Velocity through filter medium	0.2-0.5 (clean) 2-4.0 (loaded)	0.1-10	0.20-1.00	90-9
Bag Type Cloth Filters (Constant Pressure Loss)	Diffusion Inertial Electrostatic Sieving	0.6-5	5-35 Velocity through filter medium	2-8	0.1-30	0.5-1.0	90-
High Efficiency Filters (Low Dust Loadings)							
Cellulose-Asbestos Filters (OWS-6)	Diffusion Inertial Electrostatic Sieving	.03-1 per unit. (One to several hundred units comprise collector)	5 through medium	1.0 (clean)	$<10^{-5}$	0.30-0.60	99
Deep Bed Fibrous Filters	Diffusion Inertial Electrostatic Sieving	0.04-0.06 per unit. (One to several hundred units per collector)	2-50	0.1-0.5	$<10^{-4}$	0.05-0.10	10-
All-Glass Papers	Diffusion Inertial Electrostatic Sieving	.05-1 per unit. Several may be used.	5 through medium	1.0	$<10^{-5}$	0.60-0.80	99
Electrostatic Precipitation							
Single Stage Electrostatic Precipitator	Electrostatic	0.1-200	200-500	0.25-0.75	<1	0.50-2.0	80-9
Two-Stage Electrostatic Precipitator	Electrostatic	0.1-100	200-400	0.25-0.50	<1	0.25-0.50	80-

*60 to 80 per cent with particles greater than 50 microns. †60 to 80 per cent with particles greater than 25 microns.

Solutions To Air Conditioner Water Shortage Problem

With a demand for 75,000 to 95,000 residential cooling systems predicted for 1954, the problem of solving water shortages may become increasingly acute, claims Matthew M. Lawler, vice president, Air Conditioning and Refrigeration Division, Worthington Corporation.

Lawler feels that within the next few years, if the prolonged seasonal dry spells continue in so many parts of the country, many municipalities may have to follow the lead of New York, Miami Beach, Jacksonville, Witchita, and other communities, in severely restricting the use of water for air conditioning consumption.

Water Department officials have two varying opinions on the subject. One group maintains it is their job to provide adequate facilities to meet the demand while the other group advocates the conservation of water as a valuable natural resource. Both groups are correct, depending upon their location and the availability of limitless water supplies.

When the home owner or a commercial establishment is faced with severe restrictions on the supply of water, then the problem becomes manifold. It necessitates a cooperative effort toward solution. According to Mr. Lawler, the air conditioning manufacturers are now working toward less expensive water conservation devices. Meantime, users of water consuming air conditioners do have solutions to their water shortage problem.

CHARACTERISTICS OF COMMERCIAL AIR CLEANERS

Approximate Particle Size Efficiency—% by Weight			Usual Service Life, Years	Resistance to Heat, Corrosion, etc.	Miscellaneous Notes
Less Than 1 μ	1-5 μ	5-10 μ			
<10-20	10-40	50-80	5-20	Corrosion resistant materials available. Hot gases cooled in apparatus.	Good for hygroscopic materials. Efficiency dependent on location and design of spray nozzles.
80-90	99+	99+	5-20	Corrosion resistant materials available. Hot gases cooled in apparatus.	Very high power requirements.
90-99	95-99+	95-99+	1-10	Corrosion and heat resistance varies with fabrics.	For constant head, volume and efficiency vary over operating cycle (4-24 hrs) falling and rising, respectively. Must be shut down for cleaning. Moisture and oily, sticky dusts plug filter. Synthetic fabrics now available for temperatures to 275F.
90-99	95-99+	95-99+	1-5	Corrosion and heat resistance varies with fabrics.	Air volume and efficiency constant because of continuous automatic cleaning. Unit does not have to be shut down for cleaning. Moisture and oily, sticky dusts plug filter cloth. Wool felt gives best efficiency results.
99+	99+	99+	<1-2	Not resistant to heat or corrosive materials.	Low dust-holding capacity. Usually preceded by pre-filter. Air or gases must be well below dewpoint.
10-70	30-90	50-99	0.5-1.0	Corrosion and heat resistant materials available.	Efficiency and pressure loss increase with decrease in fiber size and increased packing density. Used in depths of 1-8 inches. Some may be cleaned when loaded, others are discarded. Good dust-holding capacity.
99+	99+	99+	<1-2	Resists temperatures to >1000F and acid gases except HF.	Low dust-holding capacity. Usually preceded by pre-filter. Air or gases must be well below dewpoint.
80-99+	80-99+	80-90	5-20	Corrosion and heat resistant materials available.	Suitable for high loading pressures and wet gases. Operate at 10,000-60,000 volts. Produces ozone and nitrogen oxides. Usually DC from mechanical rectifier. For coarse aerosols, precede with mechanical collector.
80-95	80-95	80-95	5-20	Corrosion resistant materials available. Hot gases may buckle plates.	10,000-13,000 volts ionizing sections; 6000 volts collection section. Produces ozone and nitrogen oxides. Primarily for light dust loads.

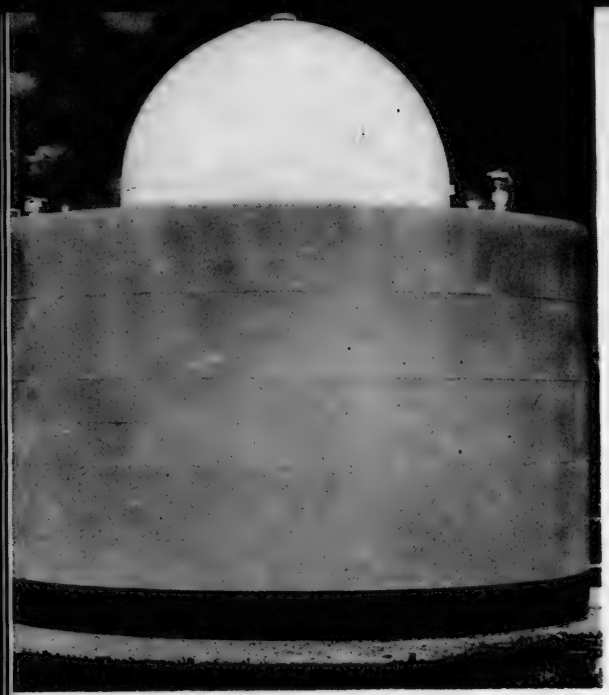
There are four methods available at present which will satisfy most water-conservation ordinances today, and at the same time affect a substantial saving in water costs. Each method has advantages and disadvantages as summarized.

Method 1—The Air Cooled Condenser.—For residential use, the air cooled condenser is the best solution to the problem. It is practicable for air conditioners up to 5 hp and involves only one heat transfer. The equipment can be mounted next to an outside wall where proper intake and exhaust openings can be provided. In the residence utilizing the central utility room, an attractively designed miniature penthouse or bubble on top of the building could provide air intake and exhaust for an air cooled condenser intentionally located high in the manufacturer's year-round heating-cooling package.

Method 2—The Fan Coil Unit.—This is a water cooling unit which may be located wherever desired, except that it should be accessible for servicing. No makeup water connection is needed. The contents of the water system can be given an initial treatment to inhibit corrosion and prevent freezing. Infrequent lubrication of the fan, pump, and motor, and cleaning of the coil faces are necessary. The efficiency of this method is slightly less than for air cooled condenser method.

Method 3—The Cooling Tower.—Need for water saving devices in regions such as the southwest, has been met by local lumber companies who sell kits of redwood parts necessary to construct such a tower.

Method 4—Evaporative Condensers.—Although the evaporative condenser is more efficient than the other methods listed, it is less desirable for residential applications because it combines the disadvantages of all of them.



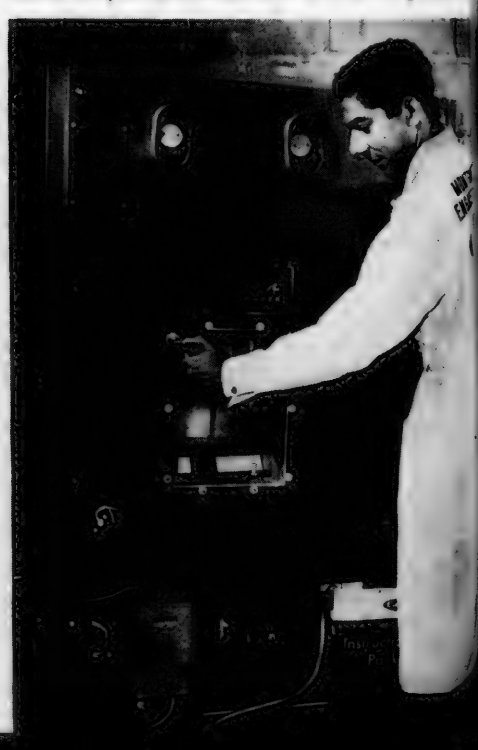
Innovation in oil storage tank design is the "Planetarium" tank, erected by Chicago Bridge & Iron Co. for Shell Oil Co. The purpose of the dome is to collect and conserve vapors which would otherwise escape into the atmosphere through the vents in conventional type roofs.

To keep Lever Bros. perfume laboratory, Edgewood, N. J., clear of lingering odors, Connor Engineering Corp. has installed a unit which filters the air through activated carbon every few minutes. Side of casing is removed to show unit, upper left. Odor-free air is needed for ventilation of new scents.

Picture Paragraphs

Huge heater section built by L. J. Wing Mfg. Co. is 10 ft long, will be used in defense project to temper make up air exhausted by processes. Temperature is controlled by blending streams of hot and cold air, not by steam control. Ingress of drafts around doors and windows caused by lowered air pressures within the building will be practically eliminated.

Salman Muhyedin of Bagdad studied air conditioning and refrigeration in Carrier Corp. training school for 13 months before returning to Iraq. Nephew of Sheik Hafidh Al-Kadl, Carrier's Iraq distributor, Salman believes there is a good market in hot Iraq for residential air conditioning units.



Design Factors in High Velocity Air Distribution

W. W. KENNEDY

Manager, Air Distribution Development, Barber-Colman Co., Rockford, Ill.

Velocities in air distribution systems will inevitably increase as space and duct work rise in cost, and techniques in fan design and outlet quieting improve. The balancing point between the economy of small ducts and the expense of increased static pressure is shifting in favor of diminished duct size in many installations.

ANALYSIS of the economic factors in any air distribution system includes consideration of the cost or availability of the space to be occupied by duct work. In many existing buildings, the decision regarding possible duct sizes is ready-made by the simple fact that space for large, low-velocity ducts is not available. Prior to the inventions and improvements in equipment which have made high velocity air distribution possible, many old buildings simply could not be air conditioned without prohibitive cost in remodeling to allow for conventional duct sizes. With the smaller duct involved in high velocity air distribution systems, many old buildings have been air conditioned without serious loss in available space.

In new buildings, construction costs of added height for duct work and the high revenue factor to be applied to urban rental area, are to be weighed against the increased power and installation costs of the high velocity system. High velocity is not the universal solution and should be used only where it is the correct engineering procedure for the particular job under consideration. It is primarily a space saving design.

Coordination of the views of owner, architect, and engineer is a prerequisite to the decision regarding installation of a high velocity system. Estimates should be made regarding the possible decrease in building cost and increased rental area in a new building. Estimates for old buildings are less tangible, and here the protection of the owner's investment should be the prime consideration. In a non-air conditioned building, possible losses in future

rentals and savings in remodeling costs using high velocity as against low velocity should be weighed against the total cost of the installation and the added operating costs of high velocity.

Obviously, high velocity cannot be developed in a system without increasing the pressure both at the fan and throughout the system. The greater friction loss of high velocity systems may require a more expensive class of fan in order to develop the higher total pressure. The resulting increase in horsepower will increase operating costs accordingly.

In high velocity systems, metal gages where rectangular ducts are used are heavier and joining and sealing techniques more expensive than with low velocity systems. A small leak or sharp turn in a high velocity duct may result in objectionable noise or excessive losses of conditioned air from the system. Sound traps at the fan discharge and acoustical linings inside high velocity duct work add their increment to the cost of installation. At the outlet, there must be a device for reducing velocity quietly to an acceptable level. Here, again, the equipment may be more expensive than conventional diffusion outlets.

In spite of all these seemingly adverse elements, the advantages of high velocity distribution are such that it is frequently the logical choice of good engineering. The design itself is basically similar in so far as delivery of air to occupied space is concerned. Admittedly, there is less opportunity to counteract the effects of poor design in a high velocity system. Dampers and throttling devices which occasionally are used to counteract poor design in conventional systems should be used less freely in high velocity systems. Otherwise, conventional methods of system design still apply.

Duct Air Velocity

The motivation behind development of high velocity air distribution systems is mainly the economy effected by reduction in space requirements for ducts. Obviously, the higher the velocity within a duct, the smaller the duct may be for delivery of a given quantity of air. It is the balancing of factors limiting the velocity selected which constitutes the main portion of the design procedure. These factors are (1) the increase of frictional resistance to flow with increasing velocity and (2) the added cost of controlling noise.

Whatever the engineer's personal definition of high velocity may be, any system with velocities higher than about 2,000 fpm will usually require special treatment. The majority of so-called high velocity systems now in use have velocities between 2,500 and 5,000 fpm, with 3,000 to 4,000 fpm being most common. Usually the design provides for reducing velocity near the ends of the ducts to about 1,500 to 2,500 fpm. The velocities mentioned allow the installation of moderately small ducts without excessive pressure and noise problems. The engineer should consider himself free to establish any velocity he believes is warranted by conditions of the particular job. Conceivably, much higher velocities could be used under special circumstances.

Once the air quantity requirements of the space and the duct velocity limits have been established, any conventional method of duct design can be used for completion of the procedure. As in all such design procedures, important considerations are the allowances for sufficient pressure at the farthest outlet and holding to a minimum losses between the first and last outlet. It is apparent that if pressure drops are excessive, any change in flow induced by the balancing procedure will result in relatively large changes in static pressure and consequent instability at the outlets.

The static pressure required at the fan is established conventionally by the air velocity required and the pressure drop in the system. This imposes another limitation on the design selection. Usually, a high velocity design will call for between 3 and 5 inches w.g. pressure at the fan in order to allow use of a Class II fan. For higher pressures, a heavier Class III fan would be required. Other factors limiting pressure are (1) the increasing importance of installation workmanship in controlling leakage from the system as pressures increase and (2) the added difficulty in controlling noise.

Ductwork

Round duct, especially in the smaller sizes, is the preferred shape for most high velocity systems. Long prefabricated lengths of small round duct can be purchased and the number of joints thus reduced. In the larger sizes, round ducts are less subject to buckling from internal pressure, permitting lighter gage metal to be used. Where a square or rectangular shape is imposed by structural requirements, the metal should be one or two gages heavier than a comparable size for low velocity. Stiffening angles and cross breaking should then be applied to large flat areas to reduce flutter and its attendant noise.

All possible care must be taken to make joints as tight as possible. Small round ducts should be joined by slip joints with a general lap and welded or soldered. If joints are to be secured with screws, they should be calked with sealer and covered with several layers of neoprene tape. Large ducts should be welded or soldered at the joint or may be joined with gaskets and flanges. Rectangular ducts are usually joined by welding, soldering or drive cleats with calking and tape. Longitudinal joints also should be carefully sealed.

Branches should take off from the main duct at an angle of 45 degrees, wherever possible, to reduce pressure loss and noise. There is usually no need for turning devices, since the pressures involved are sufficient to supply the branch without such equipment.

Friction losses should be reduced as much as possible by use of long sweeping elbows. Large elbows with turning vanes may require sound absorbing treatment.

Fan Selection

Once the duct work has been designed and the system pressure established, the fan can be selected by conventional methods. Most manufacturers are developing special designs for high velocity work with attention to low noise levels.

It is usually good practice to provide a sound attenuating chamber at the fan discharge. Such a chamber usually consists of a simple enlargement by about four inches in the diameter of the duct to allow lining with glass fiber or other types of sound absorbing material held in place by wide mesh wire screen. The length of such a sound attenuator is usually 15 to 20 ft. Where this much space is not available for a straight run of duct, baffle type sound

traps can be used in accordance with methods described in standard books dealing with sound problems.

Volume Control Equipment

When velocity and pressure must be reduced at the air outlet into occupied space, a device is required which will accomplish the reduction efficiently without noisy operation. Velocity reduction with minimum shock loss can be accomplished by a venturi type of enlargement. Provision must also be made for control of the amount of air delivered within rather wide limits. One such arrangement is an adjustable venturi valve, cross section of which is shown schematically in Fig. 1. Venturi shaped channels occur between the modified teardrop shaped vanes; and elongation of the shapes, which have fixed perimeters, results in increasing the available passage through the parallel venturi throats. Conversely, flow can be diminished to shut-off by widening the teardrop vanes. Rather close control of air discharge is thus established. The vanes are enclosed in a heavy case and all surfaces over which air flow occurs are covered with flock to reduce noise and provide tight closure. On the low pressure side of the box containing the valve, any standard diffuser or other outlet to the room can be affixed.

Design calculations may show that a practical arrangement is to use high velocity in main trunk ducts while conventional velocities are used in the distribution branches. In such case, the pressure reducing arrangement can be inserted at the branch take-off. The valve can also be arranged to control air streams of different temperatures for double duct systems.

One Installation

A high velocity air distribution system was installed at the Allstate Insurance Company headquarters in Skokie, Ill. When additional floors were to be added to the building, it was decided to extend the existing high pressure system.

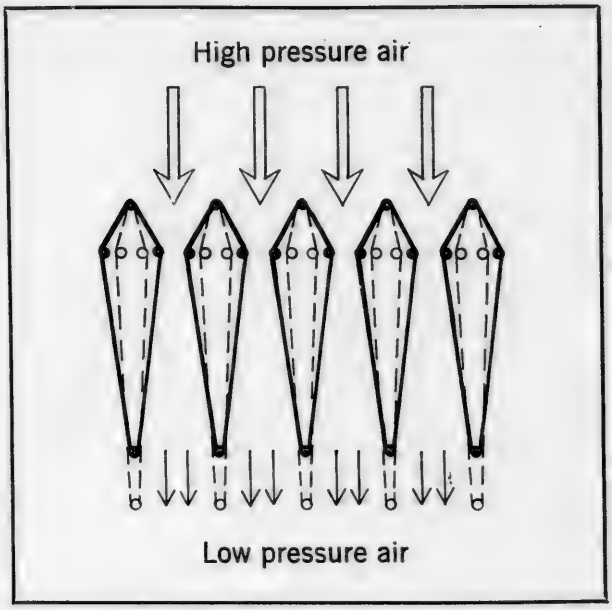


Fig. 1. Schematic diagram of air pressure reducing device.

Pressed for height in the original building, architects and engineers had installed the high velocity system to save space. The original system carried a velocity of 3,000 fpm at the fan, with a static pressure in the supply plenum of 3 inches w.g. Air valves to reduce pressure were then installed at branch take-off positions with short lengths of duct supplying conventional air grilles. The system was balanced out and has been performing satisfactorily. One stage in the installation of this system is shown at the head of this article.

Bay Mussel Conquered By L. A. Steam Plant

Users of electric light and power in Los Angeles might be surprised to hear that the lowly bay mussel could threaten the services they take for granted. But it could and did, until engineers at the Harbor Steam Plant of the Department of Water and Power, found a way to eliminate this and other organisms which were blocking the conduits that bring cooling water into the plant.

At the 1953 semi-annual meeting of ASME, H. T. Duplice, superintendent of the Harbor Steam Plant, told of the problem that took two years to solve successfully.

The harbor water is sent through condenser tubes to cool exhaust steam which condenses and is re-used to make more steam. The harbor water is brought in through duplicate conduits, either of which can carry almost the entire load of cooling water required while the other is dewatered for mechanical cleaning.

While the station has been in operation since 1943, until the summer of 1950 no conduit fouling problem existed. This was because the expansion of the Los Angeles Harbor region petroleum and manufacturing industries emptied high sulfides into the harbor waters, killing off most marine life.

Beginning in 1946 a program to minimize harbor pollution by industry was begun. Hydrogen sulfide concentration decreased and as oxygen in the waters increased, marine life began to thrive, posing a new problem—of clogging conduits, pumps and suction strainers.

Mr. Duplice and the station's mechanical engineer, Russell C. Alexander, reasoned that they must find a way to kill the marine life while it was still young. Thus the shells would be tiny enough to pass through the entire cooling system without lodging there and be carried out through the discharge conduit. A continuous chlorination system was first thought of, but this was too costly. After considerable research into possible methods they tried one which has been used successfully since June, 1952.

One of the circulating water conduits is sealed off at both ends to prevent the passage of water. This is done for five to seven days every four weeks during the spawning period of the bay mussel. The mussels consume the oxygen in the closed-off water and then die when there is no more oxygen. At the first test of this method when the stop-log of the tunnel was raised, over 45 tons of dead marine life were washed out of the conduit and into the discharge basin.

Farm A, Lucas County, Ohio. 3 hp fan supplying air to dry 525 bushels of wheat from 17% moisture to 12.4%. Depth of wheat in bin, 5 ft. Energy used, 0.6 kwh per bushel.

Farm B, Wood County, Ohio. 519 bushels of wheat dried from 15.2% to 13.2% moisture with air supplied by a 3 hp fan. Depth of wheat in bin, 9½ ft. Energy used 0.4 kwh per bushel.

Farm D, Fulton County, Ohio. 1½ hp fan supplying air to dry 720 bushels of wheat from 16% moisture to 13.4% moisture. Depth of wheat in bin, 11 ft. Energy used, 0.7 kwh per bushel.

Conditioning Wheat for Storage on the Farm

VIRGIL MARVIN

Toledo Edison Company

A great deal of the trouble occurring in the bulk storage of grains on the farm may come from the lack of ventilation. Natural circulation of air, in sufficient quantitites, through large bulks of grain does not occur.

The cereal grains are seeds and as such are in a dormant stage. In this stage they are still a living thing and therefore, are respiring, producing carbon dioxide, water, and heat. This resting stage is mainly controlled by moisture content of the grain. When attempts are made to store grain which is not sufficiently dry, the rate of metabolism is increased. When this occurs, the grain mass becomes warm. Also fungus and bacterial bodies, which are usually present, become more active under damp conditions producing molds which usually damage the grain.

Mechanical harvesting of grains has increased the storage hazard. This is especially true in the relatively humid areas. The combine and the elevator get the grain out of the field and into storage quickly. However, the farmer knows the risk of storing wheat of too high a moisture content. He also knows the risks involved waiting for the grain to dry in the field to a safe moisture content of 14% or lower for safe storage.

These difficulties are being recognized by farmers and interest is being shown in mechanical ventilation of storage facilities.

Wheat storage facilities equipped with an air distribution system for forced ventilation make possible the conditioning of high moisture grain for safe storage. This in turn makes it practical to harvest by combine when the wheat is tough resulting in less field losses and higher harvesting efficiency.

Table 1 shows results of tests of wheat storage facilities on four farms in Ohio during July 1953.

TABLE 1—OPERATING DATA—MECHANICAL VENTILATION OF WHEAT STORAGE

Item	Farm A	Farm B	Farm C	Farm D
No. of bushels	525	519	750	720
Variety of wheat	Seneca		Seneca	Seneca
Av. % moist., start	17	15.2	15.5	15.8
Depth of grain, ft	5	9½	5	11
Av. % moist., Finish	12.4	13.2	13	13.4
Static pressure, in w.g.	2.5	3	2.3	
Cfm per sq ft (top of grain)	12	10	12	8
Kwh per bushel	0.6	0.4	0.2	0.7
Fan horsepower	3	3	5	1½
Approx. hours operation	85	145	30	415
Test weight of grain (finish), lb/bu	61.5	62.5	60.0	59.5

Personnel conducting test: supervisor, V. Marvin; engineers, C. Hootman, J. Benson, and F. Rethmel.

Resistance of Grains and Seeds to Air Flow

New data on resistance of grains and seeds to air flow have been published[1] in a paper by C. K. Shedd of the U. S. Department of Agriculture. Portions of the data useful in design of forced ventilation systems are reproduced, and the effect of moisture and other factors described.

PRESSURE-FLOW data for various grains given in Table 1 and Fig. 1 were established by experimental methods described elsewhere. Data shown in Fig. 1 are for loose-filled grain of good quality and clean, that is, containing little foreign material.

Density of Grain

Each lot of shelled or threshed grain or seed was tested with two methods of filling the bin which may be called loose fill and packed fill. It is not known just how the density of grain in these tests compares with the density in a full-scale bin as normally filled, but it is thought that the grain, at least in some parts of an ordinary bin, would be packed to about the density of the packed fill in the test bin.

Effect of Depth

Pressure-flow data are given in Fig. 1 as the average pressure drop per foot depth of grain. In most of the tests this is one-ninth of the pressure drop measured in 9-ft depth. Exceptions were as follows: blue lupine, depth of 4 ft; kobe lespedeza, 4 ft; crimson clover, 1.98 ft; alfalfa, 3 ft; sericea lespedeza, 4 ft; red clover, 2 ft; alsike clover, 3 ft. Also, because of the limitation of the test apparatus to about 8 inches total pressure drop, the full 9-ft depth of grain could be used only for grains and rates of air flow resulting in a pressure drop per foot of a little less than one inch. For grains having a higher pressure drop, a reduced depth was used for tests of high rates of flow and the bin was filled to full depth for lower rates of flow.

Observations indicate that the pressures recorded in Fig. 1 and Table 1 may be a little higher than they would be when air is forced through shallower depths than 9 ft. This difference is less than the pressure variations that may be caused by differences in grain characteristics and in packing of the grain, which cannot be estimated precisely.

Effects of Moisture, Foreign Material and Density

Most of the grains were tested also at moisture contents other than shown in Fig. 1 and some were tested with additional amounts of foreign material. When data from tests of shelled and threshed grains under these various conditions were plotted, the curves for any one grain were substantially parallel. This means that the pressures were in substantially the same ratio to each other throughout the range of tested rates of air flow. Taking advantage of this characteristic of the data, a single curve is used for each grain in Fig. 1 which, as stated above, shows data for loose fill of clean, relatively dry grain. Ratios to be used to find pressures for packed fill conditions are given in Table 1, which also gives the density in pounds per cubic foot. Ear corn was an exception and a curve is shown for each lot tested.

It was found that the density was less and the resistance pressure for a given rate of air flow was less for a lot of grain at 20% or higher moisture than for the same lot of grain and the same method of filling after drying to lower moisture content. In a batch-drying operation, we may assume that the grain will be pack-filled when containing high moisture. As it dries, the shrinkage of the grain tends

TABLE 1—RESISTANCE TO AIR FLOW OF GRAINS AND SEEDS IN RELATION TO DATA SHOWN IN FIG. 1

Grain	% Moisture	Loose Fill	Packed Fill	
		Lb per Cu Ft	Lb per Cu Ft	Pressure Ratio*
Ear Corn (see Fig. 1)				
Peanuts in Shell	4.4	14.0	14.9	1.54
Blue Lupine Seed	7.5	47.2	49.6	1.45
Rescue Grass Seed	13.1	11.9	13.7	1.65
Soybeans	10.2	47.4	49.9	1.41
Shelled Yellow Dent Corn	12.4	45.6	47.7	1.34
Shelled Popcorn, Yellow Pearl Type	12.0	51.2	54.0	1.40
Popcorn, White Rice Type	14.2	50.7	52.9	1.28
Brome Grass Seed	10.5	8.8	9.9	1.64
Barley	12.0	37.3	39.9	1.46
Oats	13.2	33.1	35.8	1.54
Rough Rice	13.4	38.2	40.6	1.32
Grain Sorghum	13.1	47.4	50.0	1.41
Kobe Lespedeza	15.5	20.1	21.9	1.45
Wheat	11.3	49.8	51.8	1.30
Fescue Grass Seed	10.8	19.9	21.8	1.45
Crimson Clover Seed	8.0	47.4	51.3	1.44
Flax Seed	11.0	42.4	44.4	1.27
Alfalfa Seed	7.0	50.2	53.6	1.46
Sericea Lespedeza Seed	13.0	49.1	51.8	1.50
Red Clover Seed	dry	50.1	52.2	1.42
Alsike Clover Seed	dry	50.2	53.4	1.49

*To find pressure drop per foot depth of grain, read the pressure from Fig. 1 and multiply it by this ratio.

[1]Agricultural Engineering, September, 1953. Approved as Journal Paper No. J-2333, Iowa Agricultural Experiment Station, Project No. 587.

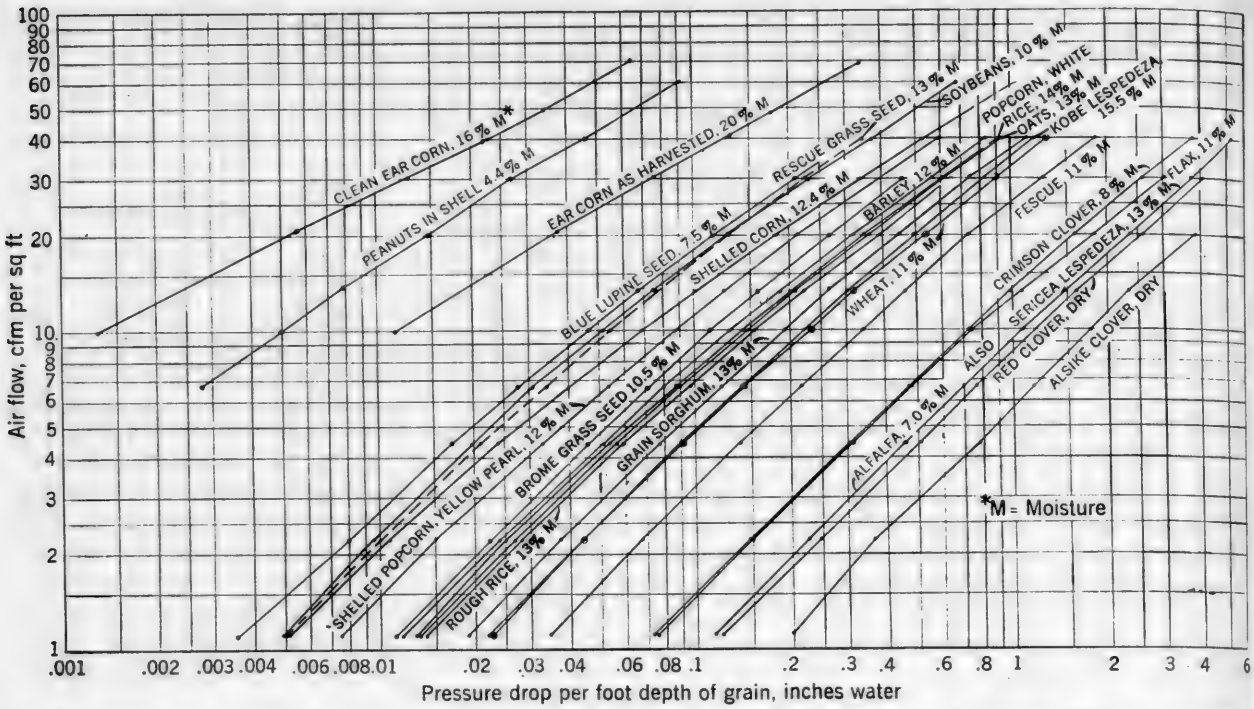

Air flow, cfm per sq ft
Pressure drop per foot depth of grain, inches water
CLEAN EAR CORN, 16 % M*
PEANUTS IN SHELL 4.4 % M
EAR CORN AS HARVESTED, 20 % M
RESCUE GRASS SEED, 13 % M
SOYBEANS, 10 % M
POPCORN, WHITE
RICE, 14% M
OATS, 13% M
KOBE LESPEDEZA
15.5 % M
BLUE LUPINE SEED, 7.5 % M
SHELLED CORN, 12.4 % M
BARLEY, 12 % M
FESCUE, 11 % M
CRIMSON CLOVER, 8 % M
SERICEA LESPEDEZA, 13 % M
FLAX, 11 % M
WHEAT, 11 % M
ALSO
RED CLOVER, DRY
ALSIKE CLOVER DRY
SHELLED POPCORN, YELLOW PEARL, 12 % M
BROME GRASS SEED 10.5 % M
GRAIN SORGHUM, 13% M
ROUGH RICE, 13% M
ALFALFA, 7.0 % M
*M = Moisture

Fig. 1. Pressure drop imposed by various grains at stated moisture content and loosely filled. For packed fill, multiply above values by pressure ratio given in Table 1.

to loosen the fill so at the end of the drying operation we may have a loose fill of dry grain. Loosening of the fill tends to offset the increase in pressure that would be expected with reduction in moisture content.

Foreign material mixed with the grain tends to increase the resistance to air flow if the foreign material is finer than the grain and to reduce the resistance to air flow if it is coarser than the grain.

Corrosion Characteristics of Aluminum Cooling Towers

The use of aluminum and its alloys in the construction of cooling towers and evaporative condensers is a relatively new development. Since the introduction of these light metals, Water Service Laboratories has been investigating the effects on them of various circulating waters. The investigation, which was made with the cooperation of the aluminum manufacturers, has led to certain conclusions with regard to the proper treatment and maintenance of the water side of aluminum evaporative cooling equipment so as to assure its maximum life.

Despite its generally good corrosion-resistant properties, aluminum will not resist attack by all circulating waters. For example, in New York City, Philadelphia and Washington, the acid gases scrubbed from the large volumes of contaminated air passed through a cooling tower increase the acidity of the circulating water to such an extent that it will attack aluminum as well as other metals. The water will dissolve copper, iron and other metals from other parts of the system, and the combination of an acidic water and traces of these metals leads to serious and rapid pitting of most forms of commercial aluminum. For these reasons, it is necessary to treat the circulating water in aluminum equipment. A procedure which avoids hazards to aluminum equipment has been developed and field tested with six different aluminum alloys in more than forty installations in three major metropolitan areas.

Many forms of aluminum are particularly sensitive to so-called concentration cell corrosion. This type of corrosion can occur when a layer of dirt settles on an aluminum surface and is maintained in a thoroughly wetted condition. If the dirt layer becomes thick enough to impede the flow of circulating water through it, even the presence of normally adequate concentrations of inhibiting chemicals in the water will be insufficient to protect the aluminum. Evaporative cooling equipment scrubs a considerable amount of dirt from the air and this tends to settle in the pan of the equipment creating exactly the condition described. Because of this, the inside of the pan or basin of aluminum equipment should be protected by painting.

Before painting the aluminum, it is important that the metal surfaces be properly cleaned and prepared before painting. All sediment and corrosion products must be removed and any traces of grease or oil must be removed by a solvent wash. The aluminum manufacturers recommend that the surface preparation include a phosphoric acid-type wash primer, followed by a zinc chromate primer and a finish coat. The finish coat may be any standard paint or bituminous coating which will resist water, mild acid, and alkali.

Details of the surface preparation and painting procedures should be obtained from the aluminum or paint manufacturer.

ASRE Hold Air Conditioner Conference

Summary of some of the interesting papers presented at an Air Conditioner Conference, which was part of the program of the ASRE convention held in Washington, D. C., last month.

NINE papers on the design and marketing of packaged air conditioners for commercial and industrial applications were presented as part of an air conditioner conference during the ASRE convention held in Washington, D. C., last month. Following are brief summaries of papers presented that are related to design.

Air Conditioning Picture

The keynote speaker for this conference was George S. Jones, Jr., managing director, Air-Conditioning and Refrigeration Institute, who spoke on Air Conditioning Today and Tomorrow.

Over one million room air conditioners were shipped by manufacturers in 1953 as compared to 45,000 units in 1947.

The problem is to convince the buying public that cooling is just as logical an addition to their dwelling place as is heating. If the people in the south were willing to pay as much money to be comfortable in the summer time as the people in the north have already accepted as necessary to be comfortable in the winter, there would be no limit to the manufacture and sale of air conditioning equipment for a good many years to come.

Much remains to be done. More standards should be developed and adopted—designs should be improved for better appearance, greater efficiency and lower cost. Together, he pointed out, ASRE and ARI can contribute mightily to progress of the industry.

A professional society such as ASRE serves its purpose only to the degree with which it offers to its members opportunities to increase their knowledge and to improve the profession. A trade association serves its purpose only to the degree with which it offers opportunities to members to increase their volume of business, their profits, and their position in our economic lives.

Air Cooled Units

J. D. Lovely, Chrysler Corp., Dayton, Ohio, spoke on The Performance and Operational Costs of Air Cooled Packaged Cooling Units. The paper is based on installations made in Dayton, Ohio, in homes near the company laboratory.

He stated that in the development of the waterless unit the company had to overcome the following problems: No water consumption; reduced maintenance; no seasonal water drainage; complete comfort control from a single thermostat station; lowest operating cost; lowest floor area requirements; installation flexibility; quietness of operation.

The size of the unit as developed is only 18 per cent larger than a water cooled unit and is only 3 per cent heavier than the water cooled type.

Variables in a cooling load area are, in addition to the problem of exposure, the individual occupancy problems including temperature desired, amount of bathing and washing, cooking habits (frequency of peak loads caused by guests and parties). The actual cooling the past summer in Dayton, Ohio, for the houses on test was less than 2,000 ton hours.

Where water cooled units are contemplated, then it is necessary to consider the declining water table, high water flow required because of increasing water temperature, low water pressure and condenser maintenance problems.

Compared to cooling tower operation, air cooled units save in operating costs. At $3.50 per 1,000 cu ft for water, then using 1,000 ton hours as a basis, the lowest water cost will be $10. To this must be added the cost of cleaning the tower and condenser—a procedure necessary two to three times yearly. Based on 2 cents per kwh for power, the cost for operating a water cooled unit is below $80 and the cost of water is almost $40 per season. The cost of operating an air cooled unit is $95. There are small areas where the operation of water cooled units would show the best economy.

Protection of Motors

The procedure of establishing safe operating limits of the hermetic motor based on maximum allowable winding temperatures was discussed by H. Wolf and H. Soumerai, product engineers, Worthington Corporation, Air Conditioning and Refrigeration Division, in their paper, Protection of Integral Horsepower Hermetic Motors as Applied to Packaged Air Conditioners.

Since the life of an electric motor decreases rapidly with increasing winding temperature, it becomes imperative that the motor winding temperature does not exceed the established temperature limit of its respective class of insulation. The insulation life decreases rapidly as the temperature is increased. It is about halved for each 8 to 12C increase.

Protective devices limit the motor winding temperature to a pre-selected safe value and allow the motor to work to its full available capacity without nuisance trip-outs.

Reports were given of tests performed with a 5 hp, 3 phase, 60 cycle 20 volt, Freon 22, self contained air conditioner unit. Winding temperatures were determined by thermocouples built in the motor end turns and by the resistance method. These tests indicated that the pro-

tection was adequate except when the unit was run continuously at voltages very much below standard tolerances, at starved coil conditions and at maximum head pressures. It is unlikely that all extreme conditions would occur simultaneously and it is a matter of judgment whether the motor should be protected against this eventuality.

In principle, the ideal protection should limit the motor winding temperature to a pre-selected safe value no matter what causes the motor to overheat.

Absorption Air Conditioning

In a talk on There is no Magic in Refrigeration from Heat, W. M. Simpson, Servel, Inc., gave a general picture of absorption refrigeration in air conditioning and data on the latest development in the direct-fired unit.

In the direct-fired unit, heating and cooling functions are in parallel in the air stream. Heat for operating the two functions is obtained directly from the combustion gases of the fuel. On the heating cycle, the flue gas from the gas burned in the combustion chamber passes upward through the passages formed by the heat transfer plates and then out into the flue vent. Heat transferred through the plates to the air in the alternate passages is delivered to the conditioned space by the air circulating system.

On the cooling cycle, the heat from the gas burned in the combustion chamber of the refrigeration unit is transferred directly to the solution in the generator. Change from heating to cooling is made through a manually operated switch. A number of units and installations were described.

Product Quality Improvement

In a paper on Self-Contained Air Conditioner Product Quality Improvement, R. G. Cordes, product quality engineer, General Electric Company, explained the methods in use by his company to control quality.

One of the more serious quality problems that had to be tackled was the control of refrigerant leaks. Early in 1951, a halide torch was used for the final leak test and this involved a check of each tube and joint with a small flame. This was superceded by a different type of leak detector, so sensitive, that it could find a leak that might lose three ounces of Freon in ten years.

To make the science of leak testing even more positive, helium leak detectors or mass spectrometers are used. When a refrigeration assembly is tested by this means, if there is a leak anywhere in the system, helium will enter. A sample of the very low pressure gas within the circuit is then taken and if helium is detected, the refrigeration assembly is rejected. Pin-pointing the leak is sometimes a very difficult job but the leak is always found. To facilitate the use of the mass spectrometer, all of the company's refrigeration assemblies have been designed to be made and tested before assembled into the cabinet.

After the conditioner is completely assembled, it is subjected to a final leak test using the sniffer or type H detector. All leaks found are plotted on charts and controlled satisfactory.

The engineering sections of the air conditioning division are held responsible for the quality of all products. A running account is kept of all field failures. A reconditioning report is made out for every returned unit and this information is coded and punched on IBM cards. A tabulation is then made showing causes for failure, percentages of production involved, action taken proposed or advised to reduce defective units.

Many minor troubles are corrected in the field by service calls. The company is interested in all customer complaints.

The quality improvement efforts of the Commercial Products Department are rounded out by such programs as engineering quality audits, engineering life tests, pilot runs, shake, impact and shipping tests, and quality improvement meetings. A bi-monthly meeting is held for each major assembly area to discuss quality problems and action necessary to improve quality.

Control of Room Humidity

A number of applications was discussed by W. O. Kline, Air Conditioning and Refrigeration Machinery Division, Frick Company, in his paper, Closer Control of Room Humidity When Using Unit Conditioners.

Loads at mild conditions were shown to require less air at lower temperatures in order to hold both the room temperature and humidity constant. Unit conditioners, using dry bulb controllers, cooled the full air volume less instead of a smaller volume to a lower temperature. When cooling this same volume less, it also happens that less moisture is removed from the air. The addition of an automatic bypass in the side of the unit and around the cooling coil controlled the relative humidity in a very good fashion. It also allowed the contractor to add a winter heating coil with winter controls and the proper change-over for year-round application.

High humidity which originated from a crowd, or walls or floors touching ground required reheating with a bypass or reheating coil.

More controls, often of the modulating type, are useful in meeting the increased demand for more comfort and for the more exact requirements that prevail in industrial production.

Different methods of control will be used for the home and the first cost must be kept down.

Packaged Units in 9-Story Building

Robert Levy of Lanier & Levy, Inc., in his paper. Packaged Air Conditioning Units and Their Application to One Specific Installation, used for his example a nine-story and basement building thirty years old. In all, 30 packaged units from 5 to 10 tons capacity are used.

All of the floors above the first are used for offices and there are three packaged air conditioning units on each floor. The system is designed for an inside temperature of 75F DB and 50 per cent RH against outside conditions of 95F DB and 78F WB. The total refrigeration tonnage is 215.5 tons and this averages 350 sq ft floor area per ton refrigeration. The lighting load is 2.5 watts per square foot.

Packaged units were selected for it showed a lower first cost than a chilled water system, it provided flexibility for zoning, and it avoided the need for cutting floors for piping, and running chilled water mains in the basement. Ducts are covered with one inch of insulation to prevent sweating. The system in this building has averaged $400 per ton refrigeration.

LONDON LETTER

Commentary on developments in Europe by our correspondent in Great Britain

IT IS a surprise to the average Britisher[1] if he happens to come across in print a reference to 98.6 degrees as the normal body temperature of an American. His own norm is 98.4, plainly indicated on the thermometer. Has the mixture of races south of the world's longest unfortified frontier produced a new strain of *homo sapiens* with a higher rate of metabolism and increased vigor? Or is it caused by living in overheated rooms? Or do they take their temperatures some place other than under the tongue? Or do they like their living spaces so warm because their body temperature is higher? Or simply because fuel is cheap?

That questions like these can be asked, and not always answered correctly, shows how careful one must be in trying to draw any conclusions from the habits of others. These habits go a long way to explaining the solutions they find to their heating and ventilating problems. One fuel technologist told a meeting in London last month that it was his misfortune to work in an office with a number of Americans. They shut the windows, turned the heating full on, and then took off their jackets and worked in their shirtsleeves; he had to have an electric fan going all the time to make the conditions bearable.

Habits are formed partly by the climate, and partly by the availability and cost of fuel. Alter some of the conditions sufficiently drastically, and the habits will change too. Human beings are not so very different when it comes to bodily requirements. There's the recent test of central heating in the French town of Melun, for example, reported by Marini and Fournol (*Cah.* No. 16;150†).

An Experiment in France With Electric Heating

A block of 48 flats was part of the housing program in this town of about 16,000 inhabitants some 120 miles south of Paris. The flats are of two types. The larger flats consist of living-room 200 sq ft, three bedrooms aggregating 370 sq ft, and kitchen and other accommodation bringing the total to nearly 900 sq ft. The smaller flats have two bedrooms, and a total of 700 sq ft. There are 24 flats of each type. Twenty large and 22 small flats were heated by conventional hot water radiators supplied from an oil-fired boiler. The six exceptions were heated electrically. The idea of this was to find out how much heat would be used for different individual rooms. Opponents of schemes of central heating say that much heat is wasted in supplying rooms that are not actually in use.

To encourage normal careful use of heat in the electrically heated flats it was necessary to charge for the current used. The full price would have been prohibitive, and a fair price was arrived at in the following way.

The running costs (but not the capital cost) of the oil-fired installation were divided up among the tenants in proportion to the volumes heated, and then a price was fixed for electricity which would make the costs of the electrically and centrally heated flats nearly the same. Each tenant also received a fixed rebate as compensation for suffering the visitation of research workers.

A January-February test period, when the outside temperature varied between 23 and 50 deg F (average 37F), produced the surprising result that the occupants were not satisfied with living-room temperatures less than 65 deg or bedrooms less than 63 deg. This was found out by altering the settings of the thermostats and asking the tenants if they liked the resulting conditions. Tenants in the electrically heated flats, whose level of education and intelligence was such that they were not expected to behave ignorantly, had complete control of their individual thermostat settings, and their behavior was carefully observed.

They were very diverse. Consumptions varied from 57 to 84 units a day, and thermostat settings from 59 to 68 deg. None of the six was a lover of fresh air. One opened the window of one bedroom for one or two hours each morning, but the other windows hardly at all. The average temperature for the six was 64 deg, which agrees closely with the figure found agreeable on an average by the other 42 families. One explanation of the unexpectedly high temperature is the high proportion of young children. But this in no way alters the fact that (if your correspondent may put it this way) these good Frenchmen, given cheap fuel, no longer behaved like their parents—they behaved like Americans!

The Fuel Situation Throughout the World

This shows quite clearly that no attempt to portray European ideas and practice in the heating and ventilating field will make sense unless it is made against a background of fuel resources. It may be very difficult for those who are sitting on half the world's known reserves of coal, and not bothering to mine them because natural gas and oil are more convenient, to visualize the heating problem when coal is in short supply and natural gas non-existent. Your correspondent, perfectly comfortable with the thermometer on the table beside him showing 64 deg while he performs a sedentary task,

[1] A convenient term, but not used of themselves by the English, Scots, or Welch.

† *Cahiers du Centre Scientifique et Technique du Batiment*, published at 4, Avenu du Recteur-Poincare, Paris 16.

finds it impossible to imagine what he would do if fuel were abundant and much cheaper. As a rough guide to comparison in terms of relative wage and salary levels, one might reckon coal at $40 a ton, kerosene at 40 cents a gallon, gas at 60 cents a therm and electricity at 3 cents per kilowatt-hour, as far as domestic conditions near London go.

The average U. S. citizen is estimated to use a fuel equivalent of 8 tons of coal a year. The average citizen of the United Kingdom uses 4½ and the world average is 1½ tons. The United States, with one-fifteenth of the world's population, uses one-third of the world's energy. Of the world's known energy reserves, 97% are in the form of coal and lignite, and 1% each in the form of oil, peat and natural gas. The known reserves of fissionable elements, thorium and uranium, amount to no more than a few percent on this basis, but they are not included. At the present rate of consumption, the coal reserves will last for 2000 years; the U. S. has a proportionate share for 2000 years, but the U. K. has only about 200 (some say 400) years to go. Oil reserves seem to increase faster than consumption, but nobody seems prepared to predict supplies for more than 50 years.

Come to think of it, all the oxygen in the earth's atmosphere must have been produced originally by plant growth, and therefore there must be as much burnable material in the world as there is air to burn it with, and some recent experiments in greenhouses in Germany have shown that the growth of plants can be much accelerated if the carbon dioxide content of the air is increased. It is not fantastic to consider this, because during the London smog a year ago the carbon dioxide content of the atmosphere touched 0.5%; in the open country it is normally around 0.03%.

Of the annual production of coal, the U. S. accounts for some 34%, Western Europe 30%, Australia, Canada, South Africa and the rest of the free world 11%, and the U.S.S.R. and satellites 25%. Roughly half western Europe's share is mined and used in Great Britain. The six countries in the European Coal and Steel Authority thus produce about 15% between them (*L'Economie* **8**, No. 365). Germany has the best and most easily worked deposits. In the Ruhr, for instance, the coal is mostly at a depth of about 1500 ft in seams 6 to 9 ft thick. Production is increasing, but this coal is in much demand for making coke for steel production, and more could be used.

Coal, Oil and Gas in France

The average Frenchman, J. Couture told a meeting of the Institute of Fuel in November, uses the equivalent of 2.3 tons of coal a year in all forms of energy, and he has a reserve of 300 tons of coal, one-tenth of the average for the world. There are only two coal fields of any size, in the Pas-de-Calais area and Lorraine, both near the frontiers. Production in 1952 was 57.5 million tons, and a further 18.5 million tons was imported. The home produced coal is not of good coking quality, but good progress is being made with producing a usable coke from some of it. Briquettes are being made from the dust of both low-volatile and high-volatile coals, and these briquettes are being used in the smaller types of heating stove. They are made by blending with a little pitch, and a method of treating them by preliminary heating in a slightly oxidizing atmosphere to about 300 deg C is being introduced to do away with the production of smoke on lighting up.

France produces only 2% of its home consumption of oil, but has now installed about 25 million tons of refining capacity for imported crude oil, and is able to export some petroleum products. There is one deposit of natural gas, producing 1000 million cu ft annually; this is about 1% of gas production, the rest being from coke ovens and gasworks.

Coal, Oil and Gas in Other European Countries

Belgian production of coal is of the order of 30 million tons annually. Cost of extraction is high, and output per man-shift the lowest in Europe. This is offset by the quality of the coal, mainly anthracite and dry steam coal, for which there is a ready market. The best Dutch coalfields are nearing exhaustion, and production is about 12.5 million tons annually. Italy is very poorly endowed, and production is only 1 million tons a year. In recent years, however, substantial quantities of natural gas have been found in Italy. J. Diemer (*Chal. et Ind. 34, 333,* 113‡) reports that this gas is 90 to 95% pure methane, and that the yield of 400 million cu ft per day is equivalent to two-thirds of Italy's normal coal imports.

Industrial users who can show a large consumption per connection to the supply are getting the gas first. There is a technological vacuum to be filled, because gas equipment on the scale needed was previously unknown in the area, and there existed at first neither the manufacturers of gas burners nor the skilled men who knew how to set about making and installing such equipment. The nearby area in Southern France, where a natural gas supply began to be exploited a year or two earlier, is giving some help. Use of gas of such high calorific value (about double) in place of city gas for domestic purposes brings its own problems. In some towns it is being mixed with air. In Milan about 10% of methane is mixed with oil-gas. At Verona the gas is cracked and reformed, and distributed at about the same calorific value as city gas. At Lodi, a town of 40,000 people 20 miles south-east of Milan, pure methane is distributed through the gas mains. In the two years since this was started the habits of the population have undergone a remarkable change and the consumption of gas, reckoned on an equivalent heat basis, has gone up ten times.

Switzerland is mainly dependent upon electricity produced from water power. For emergency purposes one of the earliest industrial gas turbines (designed to burn oil) was installed, and an almost unbelievably high efficiency was claimed. It was found on inquiry that it was intended for use only when the water froze and the atmospheric temperature was very low. A low ambient has the same effect on gas turbine efficiency as a high temperature at the turbine inlet.

Britain is beginning to make some use of methane from the coal measures, one proposal that is being investigated involving the use of mine ventilating air which contains perhaps 0.5% of methane. Our one oilfield has produced 800,000 tons of crude so far, or about a fortnight's consumption. The oil shales in Scotland are estimated to contain enough for about three years.

‡*Chaleur et Industrie* is published at 2, Rue des Tanneries, Paris 13.

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

ENGINEERS concerned with the operation of evaporative condensers may find the current discussion of interest.

Both the problem being discussed and the one scheduled for the coming issue are given on this page. If you have some comments that you would like to present regarding this coming problem, or if you have a problem that you would like to see treated in this department, you are invited to write to the Editor. Such letters are always welcome.

Here is the Problem

We have a 25-ton evaporative condenser mounted outdoors and we have had trouble with head pressure control because of changes in temperature. We have been advised that this can be corrected by cycling the water pump when necessary. If this is not good advice, then what type of control would you recommend for use with this condenser to correct our head pressure fluctuations?

This Month's Problem

There are several methods of head pressure control available and some possess greater degrees of refinement than others. An effort will be made to list relative advantages and disadvantages and to select those which are believed most desirable from an over-all standpoint. At the same time, it is recognized that there are many jobs operating satisfactorily on any of the commonly accepted methods of head pressure control, and the final selection will be based on individual preference, together with the particular operating characteristics of the job under study. Typical installation examples of most of the various methods will be given.

The simplest and least expensive control to employ is a simple discharge pressure control arranged to start and stop the water pump of the evaporator condenser in response to head pressure. This control is set so the evaporative condenser water pump is shut off when the head pressure drops to approximately 100 psi. It will cut back "on" automatically when the head pressure builds up to approximately 125 psi. Use of an electrical type of control is usually preferable with this method. As indicated, the cycling of the water pump on head pressure is the simplest and probably the cheapest method of control. In many cases, this type of control will produce results that are entirely satisfactory.

There are, however, several disadvantages to this method that will be readily appreciated. To avoid short cycling of the water pump, it is necessary to maintain a fairly high differential in the control switch. Also these switches are built with a relatively large differential, unless a special design is specified. These two factors result in a wide swing control instead of gradual control that is accentuated by the time lag created by the wetted surface of the coil. As a result, the head pressure will frequently overshoot after the pump is shut off on the down swing of pressure, and will then build up slowly as the coil surface dries until the cut-in point is reached. At the cut-in point, it will drop rapidly as the sprays come on, and as the condenser changes over from dry to wet type of operation. On some installations, the over-shooting in a downward direction may run appreciably higher than this.

In addition to the lack of a closely controlled pressure result, the constant wetting and drying of the evaporator coil surface tends to collect solids on the coil, and over a period of time may result in incrustation at an accelerated rate. Most coil manufacturers design their coils for continuous flooding to minimize this condition; changing the operating cycle will adversely affect the result. An important disadvantage is the possibility of decreased life of motor and starter, owing to starting and stopping much more frequently than would be required with normal duty operation.

Another simplified method of control that has many of the same characteristics as the cycling of the water pump is to cycle the evaporative condenser fans, again on a simple on-off head pressure controller. This method has about the same advantages and disadvantages as the preceding control scheme except that in addition, it may shorten belt life appreciably as the result of frequent starting and also stopping.

Some contractors make it their practice to use either cycling of the water pump or cycling of the evaporative condenser fans to control head pressure, whichever gives the better results. Field reports have indicated that one of

Problem for the Coming Issue

. . We have a ventilation problem. Fumes given off from a tank during a hot dip cleaning operation, are not properly handled by the hood which draws in the air at the rear of the tank, along the long side. The tank is 7 ft. long by 3 ft. wide and we use an air velocity of approximately 2,000 fpm. What should the slot width be? If we increase the velocity to 2,500 fpm, then what should be the slot width?

these methods may give better control on some jobs than the other. In some cases, this has occurred even on two separate installations in the same plant.

In one case where an evaporative condenser system was required to operate during extremely cold periods, it was found necessary to use both the previous controls in conjunction with one another. The controls were arranged so that if the head pressure drops to 122 psi, the fans stop. If pressure drops to 110 psi, the pump shuts off. There was a reported overshooting of the head pressure on the way down of about 10 psi after the cut-out had stopped the water pump and while the coil surface was drying. In the reverse direction, as the head pressure increases, the pump starts when the discharge exceeds 120 psi, and if it continues to increase, the fans start when pressure reaches 132 psi. Both fan and pump operate above this point.

In actual operation, it turns out that the principal method of control is by cycling the fan, with the pump going off only in extremely cold weather. Despite this fact, it is stated that there is no noticeable belt wear in one full year of operation. This combined method of control requires two pressure-actuated controllers with the operating points adjusted differently, as indicated.

Howard Blair
Product Manager
Hyde Park, Mass. *Westinghouse Electric Corp.*

Although it may be possible to obtain a partial control of head pressure by cycling the water pump, it cannot be recommended. First, because dry coil operation will cause short cycle of operation as the capacity of the surface will be greatly reduced. This cycle will become very short if the condenser coil is bare tube, that is, without fins. Second, because the water which remains on a coil when the pump is turned off will evaporate and leave behind the solids which build up rapidly and foul the surface.

For a more satisfactory method of control of head pressure we recommend that dampers be applied to the condenser air. The simplest arrangement of this application is to place dampers only in the air inlet to the condenser which are automatically controlled by the use of a modulating damper motor with a thermostat bulb located either in the water of the condenser or in the air stream. An alternate method is to have a modulating control situated by the head pressure of the condenser gas.

F. Edward Ince
Engineer
St. Louis, Mo. *Marlo Coil Company*

Our suggestion for controlling the head pressure on an evaporative condenser would not be to attempt to control the operation of the spray pump. The amount of water circulated by the spray pump should not be varied because it is used for two purposes; first, for evaporative effect over the coil, and second, to keep the coil clean of lime and dirt. If this water quantity is cut down, it will cause the coil to lime up eventually and a difficult cleaning job will result.

Our suggestion would be to use a mixing control box, controlled either from head pressure or condensing temperature, which would allow a mixture of outside and recirculated air circulated over the condensing coil, thus varying the capacity of the machine.

C. L. Ringquist
Manager, Air Conditioning Sales Div.
La Cross, Wis. *The Trane Company*

Standards for Cast Iron Pipe

Twenty-seven years of experiment and research have resulted in nine American Standards, published recently, for improving cast iron pipe.

The new standards provide uniformity in methods of determining the thickness and length of cast iron pipe, depending upon the pipe's diameter and the pressure it must withstand. These specifications, dealing with both spun pipe and cast or molded pipe, also include data on reasons for failure of cast iron pipe and methods for preventing corrosion.

The standards were developed under ASA Committee A21, which was formed in 1926 to undertake this project. Committee chairman since that time has been Thomas H. Wiggin, consulting engineer. Mr. Wiggin represents the American Water Works Association in the project.

Mr. Wiggin stated: "Our committee has one important task remaining. That is to recommend dimensions, thicknesses, and pressure ratings for fittings over twelve inches in diameter. This is the committee's present undertaking."

The committee, organized under the auspices of ASA, is made up of 35 producers, users and other groups interested in standardization of cast-iron pipe. Administrative leadership of the project was furnished by the American Gas Association, American Society for Testing Materials, American Water Works Association, and New England Water Works Association, acting as sponsors. The standards on cast iron pipe and fittings follow:

Cast Iron Pit Cast Pipe for Water or Other Liquids (Revision of A21.2—1939, A21.2—1953)

Cast Iron Pit Cast Pipe for Gas, A21.3—1953

Cement Mortar Lining for Cast Iron Pipe and Fittings (Revision of A21.4—1939, A21.4—1953)

Cast Iron Pipe Centrifugally Cast in Metal Molds, for Water or Other Liquids, A21.6—1953

Cast Iron Pipe Centrifugally Cast in Metal Molds, for Gas A21.7—1953

Cast Iron Pipe Centrifugally Cast In Sand-Lined Molds, for Water or Other Liquids, A21.8—1953

Cast Iron Centrifugally Cast in Sand-Lined Molds, for gas, A21.9—1953

Short Body Cast Iron Fittings, 3-inch to 12-inch, for 250 psi, Water Pressure Plus Water Hammer, A21.10—1952

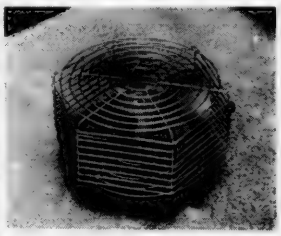
A Mechanical Joint for Cast Iron Pressure Pipe and Fittings, A21.11—1953

NEWS OF EQUIPMENT AND MATERIALS

Use the prepaid postcard opposite page 123 for securing additional information on items described in this department.

Fan for Use in Winter and Summer

The Filt-R-Fan, designed for use in winter as well as summer, invented by E. R. Troxell, Jr., is built and sold by Griffon Productions, Sag Harbor, N. Y. With a filter suspended in place, as illustrated, it draws air from all parts of the room, especially from the warm spaces near the ceiling, forcing it downward. Dust particles are trapped in the filter, while the air is dispersed to flow gently in all directions along the floor. This action, so mild as not to be objectionable, even in cold weather, keeps the room air in constant circulation, avoiding stratification and cold 70. Whether allergic to dust or not, the results are noticeable to anyone in the room.



For hot weather use the filter is removed and the fan placed on one edge or on a window sill, or even hangs, spring-mounted, as a kitchen exhaust.

It is equipped with a motor designed to operate at all angles and lubricated for life. The complete unit weighs 6½ lbs.

More information? Circle Item 1 on postcard, page 123

Seven Models Gas Unit Heater

A new gas unit heater is announced by Warren Webster & Co., Camden, N. J. The seven basic models of this completely self-contained automatic heating unit range in capacity from 25,000 to 200,000 Btu per hour heat input, and all units carry the approval seals of AGA and Underwriters' Laboratories.

Design features of the heater include raised port design burner, removable burner drawer, automatic gas control valve, gas pressure regulator, and automatic safety pilot to prevent discharge of gas in the event the pilot burner is extinguished.

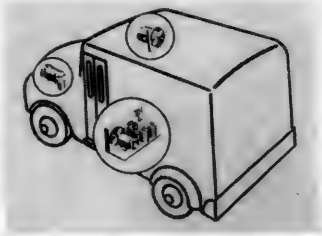
Among advantages claimed for the heater are clean heat spotted wherever it is wanted, quick response, low installation cost, no fuel storage, elimination of overnight and week-end firing, and conservation of floor space. The unit can be used with natural, manufactured, mixed, or liquefied petroleum gas. Burners, orifices and controls are varied according to the characteristics of the gas to be used.

Bulletin B-1710A is available.

More information? Circle Item 2 on postcard, page 123

Mobile Refrigeration System

A new system which makes possible around-the-clock, full capacity, high-voltage refrigeration for light delivery trucks is announced by General Electric Co., Specialty Component Motor Dept., Schenectady, N. Y. Applications include use on trucks carrying milk, cheese, meat, ice cream, frozen foods, produce, flowers, beer, soft drinks, and other products susceptible to high temperatures. Operation is completely automatic and independent of the driver.



The system, designed to operate at full capacity off the truck crankshaft whether the engine is idling or running at maximum road speed, also can utilize standard 115-volt 60-cycle house current when the engine is not running.

Because it was developed to operate on high voltages, no extra motors or transformers are required when standby power is used, and maintenance costs are reduced. Battery power is not required at any time. The standby operation will allow fleet owners to load up their trucks in the afternoon for the next day's delivery.

Five components make up the electrical unit: a heavy-duty alternator which is mounted on a truck engine and is belt-driven from the crankshaft; a small d-c motor to drive the evaporator blower; a voltage regulator which maintains constant system voltage completely independent of wide engine-speed variations; a compressor drive motor; and a selenium rectifier to serve double-duty in providing d-c voltage to the system from the engine-driven alternator as well as from the 115-volt a-c standby source.

More information? Circle Item 3 on postcard, page 123

Low Cost Electronic Cleaner

A low-cost electronic air-cleaning unit, the PX Precipitron, is available from Westinghouse Electric Corp., Boston, Mass. Combining 90% cleaning efficiency with a simple push-button method of spray-washing, the new unit cuts maintenance costs and eliminates inside-the-duct washing of cells.

Accumulated dirt on the electronic collector-plate surfaces of the unit is flushed away by penetrating hot water from needle-spray nozzles attached to a motorized header. After moving slowly across the unit's face, the header automatically reverses and returns to the start position. The same traveling header applies an adhesive oil to the collector-plate surfaces when washing is completed. The oil binds collected dirt together and acts as a solvent for the wash operation.

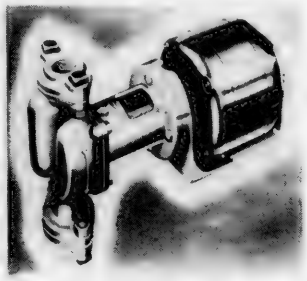
Height and width of the unit depend on the cleaning requirements of a proposed system. Power packs and control units are located outside the duct.

More information? Circle Item 4 on postcard, page 123

Hot Water Specialties

Addition of a new and complete line of hot water heating equipment is announced by C. A. Dunham Co., Chicago, Ill. The new line includes circulators, valves, fittings, specialties and controls.

In addition to the circulator (illustrated), the company will produce a complete line of circulator valves having extra-large water flow areas; balancing elbows and fittings with a unique sloping valve seat that assures accurate and fast system balancing; and diaphragm-type pressure relief and reducing valves.



The new expansion type air vents are designed for both automatic venting and for manual shut off as well. A companion product is the float type air vent. Flow diverter fittings are bronze, in both thread and sweat connection types. It is claimed only one fitting is needed per unit of radiation.

This new line also includes flow control valves; a one-piece, dual-purpose air separator and fully automatic indoor-outdoor temperature control systems known as Vari-Flow.

A distributor head, it is claimed, will simplify radiant heating installations. These heads come in 5 ft 3 in lengths that can be cut like sausage; each length has 14 pairs of connections. The 1¼ inch trunks have completely interchangeable ⅜ or ½ inch branch connections.

More information? Circle Item 5 on postcard, page 123

Asbestos-Cement Gas Vent

Transite Type B-W gas vent is a new asbestos-cement product developed by Johns-Manville, New York, N. Y. It is designed specifically for recessed wall heaters that are gas fired, and is approved by Underwriters' Laboratories for ⅜-inch minimum clearance to combustible surfaces, permitting installation in standard wall construction without furring.

This vent has an oval backbone of asbestos-cement pipe. Around this is a jacket of light weight aluminum. The two are separated by spacers that extend the full height of the vent.

The outside dimensions are 2¾ by 7½ in. by either 4 ft. or 5 ft. so that the vent fits neatly between 2 by 4 in. studs spaced 16 in. on center. The foot of the vent has two metal angles for attaching it to the header plate of the heater. The top of the vent may be either round or oval for ready connection to Transite Type B gas vent, the material recommended to complete the venting through the roof.

The vent is light in weight so that it handles easily. Installation work takes only a few minutes. The vent is designed to resist the rough handling sometimes encountered during construction. The backbone of asbestos-cement guards against permanent deformation or closing of the air space that would choke the vent.

In service, this vent will handle flue gas temperatures up to 550 deg. F. The heat stays inside the vent and the outer surface remains cool.

More Information? Circle Item 6 on postcard, page 123

Diaphragm Motor Control Valve

A new line of diaphragm motor control valves, incorporating a number of engineering improvements, is announced by the Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

The new valve, Series 800, was designed for use with wide-band, proportional control instruments widely used in industry. The valve features a completely redesigned diaphragm motor with pressed steel case plates.

More information? Circle Item 7 on postcard, page 123

Mobile Air Conditioner

A mobile water cooled air conditioning unit that does not require expensive installation or permanent fittings and can easily be moved from room to room whenever desired, is marketed by Union Asbestos and Rubber Co., Chicago, Ill.

The unit rolls easily on rubber composition wheels and can be handled by any housewife. Because it does not require permanent installation fittings, home owners in areas where water charges are high, can attach the drain from the unit to a garden hose and use the water passing through the unit to sprinkle their lawns or gardens. This can result in substantial economies by re-using water that would normally be wasted.

The air conditioner is only 28 inches high, 18 inches wide and 17 inches deep, yet powerful enough to cool a 500 sq ft room on the hottest days. It is designed to go with both traditional and modern furniture. The cabinet, encased in vinyl plastic, comes in either dark brown or ivory.

When the cooling season is over, it is wheeled into a closet where it is out of the way until the following summer.

The unit weighs less than 200 pounds and is equipped with a squirrel-cage type fan driven by a ¾ hp motor, delivering 250 cfm.

A switch permits it to be operated with the refrigeration unit shut off so that it can be used as an air circulator or fan, if desired. Water can be drawn from any household tap through a ⅜ in flexible rubber tube, similar to that used on a bath spray. All air passing through the air conditioner is drawn through a filter, which removes dust, dirt and pollen.

More information? Circle Item 8 on postcard, page 123

Electric Radiant Heat Cable

Electric cable for residential radiant heating is a new product of Electromode Corp., Rochester, N. Y. Coils of the cable are located in the ceiling.

The cables are a measured length of specially constructed and insulated electric wires; waterproof and non-corrosive. This system never needs repairs and will outlast the building in which it is installed. A special feature of the cable is the seal which eliminates possibility of streaks on the ceiling.

Advantages of electric radiant heating include even temperatures and freedom from drafts, invisibility, no noise and no odor, and no combustion of fuel.

As this system eliminates the need for chimney, ducts, or even a basement, it simplifies house construction and speeds erection. The cable is simply stapled to the ceiling lath and covered with plaster. It can be installed in homes of any style, new or remodeled, one story or more.

More information? Circle Item 9 on postcard, page 123

Expansion Compensator

A new expansion compensator for hot water steam heating systems that requires no maintenance or adjustment and will stand up as long as the system of which it is a part has been developed by Flexonics Corp., Maywood, Ill.

In principle, the compensator is a phosphor bronze bellows protected by a floating brass shroud, which also helps guide expansion and contraction strokes of the bellows in a straight line. The device may be installed in low pressure steam or hot water lines carrying pressures from 40 psi to 60 psi and temperatures up to 250 deg. F. It was especially designed for finned-type convectors, baseboards, radiator or heating supply and return lines.

Installation is as simple as any pipe fitting. Diameters of ¾, 1, 1¼ and 2 inches are available. The stroke of the bellows is ½ inch compressed and ¼ inch extended. One compensator will absorb expansion for up to 30 feet of copper tube, or 50 feet of steel pipe. Piping must be accurately guided and well supported adjacent to each end of the unit.

Fittings on the bellows are copper tube male ends. Silver soldered fittings and electronically sealed joints insure maximum strength and leakproof life.

More information? Circle Item 10 on postcard, page 123

Summer Conditioner, 2, 3, 5 Tons

A new summer air conditioner for homes is announced by Surface Combustion Corp., Toledo, Ohio. Known as Model SAC, it is sized and finished to match the FES and FEC series winter heating units.

The unusually quiet compressor operation has been found especially desirable in residential and certain commercial installations. This quietness is further achieved by use of thick fiber glass acoustical and thermal insulation which protects the unit from extreme heat while adding to the sound-deadening features.

Three models are offered. The 5-ton capacity unit is a combination of the 2 and 3-ton capacity models. All are housed in a blue-gray finish steel casing no larger than the average refrigerator. Standard equipment includes a large capacity, resilient-mounted centrifugal fan, driven by a 230-volt, 60-cycle single-phase continuous duty motor. The motor has overload protection. The fan sends cooling air through the same ducts used by the winter air conditioner unit.

The hermetically-sealed compressor is driven by a direct connected, integral horsepower motor. The unit has a water-cooled condenser and the refrigerant is controlled by a twin-capillary tube restrictor.

More information? Circle Item 11 on postcard, page 123

Stainless Steel Float Trap

A new float trap made entirely out of stainless steel has been developed by The V. D. Anderson Co., Cleveland, Ohio, for draining corrosive liquids from air, gas and steam confined in piping systems and equipment.

Applications for the float trap include the chemical, petro-chemical, refining, natural gasoline, textile, paper-making and food industries; in fact, wherever corrosive liquids are handled.

This automatic trap drains liquids as fast as they are formed continuously without permitting the escape of air or gas. The trap mechanism consists of a valve and seat, a lever, and a ball float inside of a case, all made of stainless steel. The liquid, upon entering the unit at the top, raises the float, opening the valve, and permitting the escape of the liquid. An accumulation of any steam or gas lowers the liquid float, causing the float to drop. This action closes the valve.

After assembly, each trap is given a final hydrostatic test to check the tightness of valves, gasket joints and body. The trap is designed for 300 lb. pressure and maximum total temperature of 800 deg. It is made in sizes ½ to 2 inches.

More information? Circle Item 12 on postcard, page 123

Repairs Damaged Galvanizing

Farco Brand Z, a powdered metal containing flux, developed for restoring galvanized coating and repairing areas damaged by welding, is announced by Farrelloy Co., Philadelphia, Pa. It meets Government specifications for repair of galvanized metal damaged by welding, and has qualified by withstanding 800 hours in a 20% salt spray bath without rusting.

The product will actually remove the scale from black iron, penetrate rust and grease, and deposit a zinc alloy coating protecting the base metal from corrosion. It does not leave any line of demarcation but amalgamates with galvanizing. It may be applied without difficulty in flat, vertical and overhead positions. It binds more tightly than hot dipped and will not flake off.

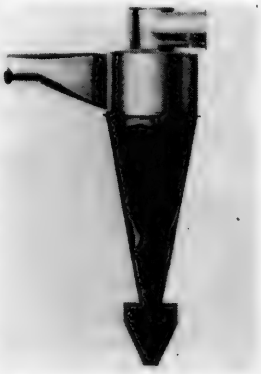
It contains a powerful flux that will cause the metallic content to coat any metal including copper, stainless steel, monel, Inconel, nickel, chromium and Evanohm. It is completely stable, does not pick up moisture or deteriorate in can. Compound may be applied with either torch or soldering iron depending on thickness of the metal.

The product will accept tin-lead solders and may be used to increase the tensile strength of these solders by increasing their adhesion on metals difficult to solder. It sells for $3 per 2 pound can.

More information? Circle Item 13 on postcard, page 123

Mechanical Dust Collector

A new mechanical dust collector, the Dustmaster, is announced by A. W. Banister Co., Inc., Cambridge, Mass. It separates dust from air by means of centrifugal force and has application in industrial plants for removing nuisance, toxic and hazardous dust, thereby reducing equipment maintenance, increasing productivity, improving product quality, maintaining a clean, healthful working atmosphere, and also for other purposes such as collecting valuable materials from dust, or as a pre-cleaner for filters and electric precipitators.



The collector is a cyclone of modern design. It incorporates improvements in efficiency and operating economy. It incorporates the simplest yet most practical design features and has low energy loss. It is economical to install and requires a minimum of space.

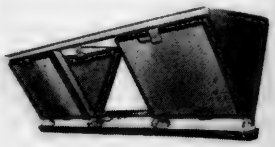
The collectors are built in standard sizes from 18 to 84 inches diameter of body. They are available in single, duplex, quadruplicate, and two-stage arrangements, and can be operated either under suction or pressure.

The unit is recommended for collecting and separating all manner of dry industrial dusts when the gas temperature does not exceed 800 deg, and when the shape and weight of the dust particles are such as to make mechanical separation practicable. A 12-page catalog is available.

More information? Circle Item 14 on postcard, page 123

Adapter To Grease Eliminator

A new V-type sectional adapter for limitless, end-to-end installation of filter sections in its Far-Air kitchen grease eliminator is announced by Farr Co., Los Angeles, Calif. In use, the adapter provides easy installation of sections to any desired length for any volume. The adapter unit is of heavy gage construction, supplied in either gray baked enamel finish or stainless steel.



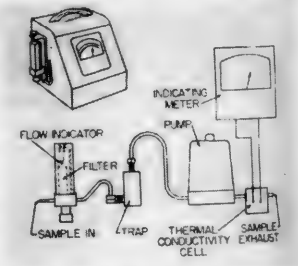
The kitchen grease eliminator, in widespread use in restaurants, hotels and commercial cooking establishments, reduces fire hazard by preventing the accumulation of highly inflammable grease in the kitchen exhaust system, and helps to maintain proper ventilation and sanitation. Maintenance costs are lowered because duct cleaning is virtually eliminated. Frequency of painting and redecorating is also reduced.

The kitchen grease eliminators and endless adapters are available in a variety of sizes, supplied in modern designs and finishes to match existing equipment. Descriptive literature and installation drawings are available.

More information? Circle Item 15 on postcard, page 123

Simplified CO_2 Analyzer

Flue gas analysis of small boilers and heaters can be completed simply and quickly with the Thermco portable unit developed by Thermco Laboratories, Michigan City, Ind., formerly Instrument Engineering Service.



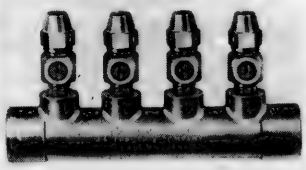
Drawing its own sample from the flue, the instrument will deliver an accurate, continuous CO_2 reading within 20 seconds. The readings will change within 5 seconds after a change has occurred in the flue. All readings are indicated on a 0 to 20% range dial on the face of the unit, accurate to ¼%.

Ease of operation, combined with convenient portable size, continuous and direct reading and fast response, makes the new analyzer a valuable tool for research studies and industrial and institutional fuel users as well as heating contractors and fuel distributors.

More information? Circle Item 16 on postcard, page 123

Radiant Heat Specialties

Manifolds and balancing valves have been added to its line of radiant hot water heating products by H. A. Thrush & Co., Peru, Ind.



The manifolds, without balancing valves, serve as supply manifolds. As supply manifolds they save fittings, reduce the number of solder connections, and simplify installations. At the return connections a manifold with balancing valves (illustrated) is used. Purging of air and balancing circulation in each coil is done quickly and positively with the balancing valves. Eliminating air quickly and surely from coils is the advantage of these valves.

The manifolds are available in 1 and 1¼ inch main size with 2, 3, and 4 branch outlets for either ⅜ or ½ inch coils. Where more than four branches are needed, manifolds are installed in multiples to make the necessary number of outlets.

The manifolds and balancing valves are shipped from the factory in separate attractive cartons which can be used as displays on shelves or counters.

Form MBV-1053 is available.

More information? Circle Item 17 on postcard, page 123

Chemical Resistant Cement

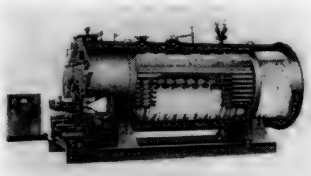
Vitroplast, a new vinyl base chemical resistant cement which is completely resistant to hydrochloric acid, phosphoric acid, 60% sulfuric acid, 5% nitric acid, 5% chromic acid, sodium hypochorite, benzene, gasoline, and chlorine dioxide at temperatures up to 150 deg. F., is announced by The Atlas Mineral Products Co., Mertztown, Pa.

Unlike standard chemical resistant resin cement, it does not require acid or alkaline setting agents and will set in contact with concrete or steel and under adverse conditions. It has a working time of approximately 40 minutes and a setting time of less than 2 hours at ordinary temperatures and is available as a white bleach resistant cement.

More information? Circle Item 18 on postcard, page 123

Oil or Gas Boiler-Burner Units

The Kewanee-Petro boiler-burner unit is jointly announced by Kewanee-Ross Corp., Kewanee, Ill., and Petro, Cleveland, Ohio. These new units are designed to satisfy the need for a fully integrated and engineered boiler-burner combination, with wide flexibility of application.



Boiler-burner units include both steam and water models, ranging in sizes from 39 to 456 hp. for high pressure steam and from 1,313,000 to 15,300,000 Btu per hour for 15 lb steam or 30 lb water. They are equipped for firing No. 6 or lighter oil, or for high or low pressure gas, or for a combination of the two. With combination models, shifting from one fuel to another is quickly and easily accomplished.

While engineered as one complete boiler-burner unit, the boilers and burners are separately manufactured by the two companies. The boilers, shipped direct to the job from Kewanee, Illinois, are Scotch type, pre-tested, equipped with all necessary accessories and mounted on steel skids. Burners shipped from Cleveland, include forced draft air supply and all combustion controls, mounted and pre-wired in one central control cabinet. The burner, controls and accessories are completely assembled and factory tested before shipment.

Matching connections make it possible to attach the burner to the boiler quickly and easily. Refractories are integrally mounted at the factory, cutting time and labor required in the field to an absolute minimum. Forced draft burner operation eliminates the need for a high stack; a small vent, extending above the roof, is the only requirement. Local service will be supplied on the boiler-burner units by the combined Kewanee and Petro field organizations.

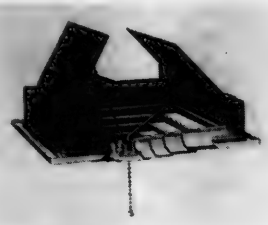
A 16 page illustrated catalog is available.

More information? Circle Item 19 on postcard, page 123

Square Ceiling Diffuser

A new square design ceiling diffuser has been added to its line by Lima Register Co., Lima, Ohio.

Featuring complete four-way diffusion without drafts, the Series 60 ceiling diffuser has a series of step down vanes that discharge air outward and slightly downward in all directions at reasonably high velocity. It can be installed either as a warm air or cooling outlet. It is also recommended for return air, especially for perimeter installations, eliminating large unsightly grilles.



The square design harmonizes with rectangular constructed rooms and modern, square block ceilings. It has a light beige actual finish which can be repainted if desired. A sponge rubber gasket assures a tight, streak-proof fit.

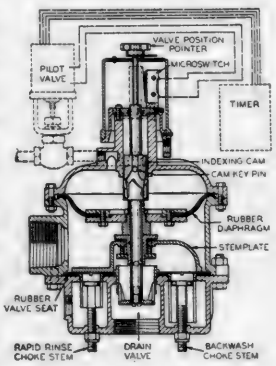
The diffuser damper has a full center opening which delivers air through the center of the diffuser for a more effective diffusion pattern. The Balancing Bell control feature is a part of the damper, providing simplified balancing by putting the volume control right in the diffuser. Once the system is balanced, the room temperature can be easily regulated. The damper closes tightly to assure full heat shut-off, an important advantage in sleeping room installation. A new installation ring, 2¼ inches deep, is also available for easy installation when a damper is not used.

The diffuser is available for immediate delivery in six sizes: 6 x 6, 8 x 8, 10 x 10, 12 x 12, 16 x 16, and 20 x 20 inches.

More information? Circle Item 20 on postcard, page 123

Water Treatment Valve

A new 2-inch multi-port valve for automatic regeneration cycle control of commercial and industrial water softener, filter, and ion-exchanger systems is announced by Automatic Pump & Softener Corp., Rockford, Ill.



Regulated by automatic electrical controls and operated by time clock, the regeneration cycle can be accomplished without supervision during off work-hours, or, two or more systems can be automatically coordinated to provide a constant supply of treated water for round-the-clock operations. Regeneration cycles can be precisely controlled. Once adjusted to suit local water conditions, the cycles never vary, and the guesswork of hand-operation is eliminated.

The simplified design requires only one moving unit in the valve. Sediment and foreign matter are flushed clear each time the stemplate-cam assembly is indexed. For periodic servicing, the entire assembly is easily accessible by simply removing the bonnet cover—no piping need be removed.

More information? Circle Item 21 on postcard, page 123

New Air Conditioner Line

A line of completely new commercial package units, and new residential air conditioners designed to be used with a warm air heating system for year-round air conditioning, is announced for 1954 by Worthington Corp., Harrison, N. J.

The package unit has been redesigned completely, inside and out. The cabinet design presents an improved decorative beauty with a semi-gloss beige enamel finish trimmed with contrasting strips of gold. The simplified operating controls are concealed behind an enamel nameplate with a maroon background and gold lettering. The nameplate is hinged with a spring return to allow easy access to the controls.

A reset control conveniently located on the selector switch concealed behind the nameplate, promises a new freedom from temporary shut downs and service calls. Should the protective relays trip out because of water or power interruption they may be reset with a twist of the selector knob, without removal of panels.

Three-dimensional air circulation is featured with the new units. Horizontal louvers of an airfoil shape to reduce ar resistance, and vertical vanes are adjustable individually to allow circulation of air in any chosen direction.

New vertical air intake prevents collection of dust and dirt, resulting in less chance of soiling materials which may brush against the unit.

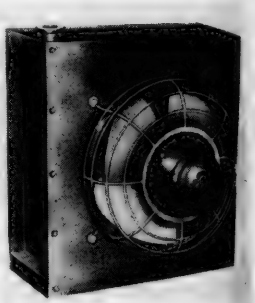
Outside winter air can be tempered with a two-row steam or hot-water heating coil, available as an accessory, A spray type humidifier, which can be mounted between the heating coil and the cooling coil is also available as an accessory. The new unit also incorporates a new hermetically sealed compressor, double oil pump, efficient motor cooling, resilient mounting, and new quietness.

The package unit is available in capacities of 3, 5, 7½, 10 and 15½ tons.

More information? Circle Item 22 on postcard, page 123

Unit Heaters Improved

A new type of construction on certain sizes of the company's Utility unit heater, a horizontal discharge heater, as well as on its suspended, vertical discharge revolving unit heater, is announced by L. J. Wing Mfg. Co., Linden, N. J.

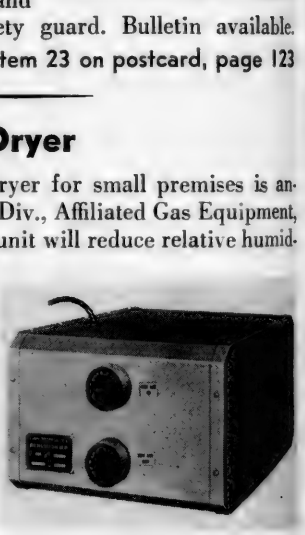


The feature of this construction lies in combining the motor mount with an integral safety guard. The result, it is claimed, is a more rigid type of motor mounting and more strength in the safety guard. Bulletin available.

More information? Circle Item 23 on postcard, page 123

Adsorption Air Dryer

A new adsorption air dryer for small premises is announced by Bryant Heater Div., Affiliated Gas Equipment, Inc., Cleveland, Ohio. The unit will reduce relative humidity in controlled areas from as high as 90% to 8%.



The air dryer is plugged directly into 115 volt electric circuits. It may be controlled by a standard humidistat, and requires no drains or other connections. In operation, it brings in outside air, dehumidifies it, and exhausts moisture laden air from inside. Damp air passes through a bed of silica gel, trapping moisture within the particles of gel. A small electric heater continuously regenerates the gel.

In periods of high humidity, the Bryant unit will remove from the air up to 21 pints of water per day. The air dryer mechanism will not frost, and its efficiency improves as its control level is lowered.

At high levels, about 60% of the moisture in the air is removed. At low levels, more than 90% of the moisture is removed in a single air pass through the unit.

More information? Circle Item 24 on postcard, page 123

Power Hole Digger

One man does twice as much in half the time with the Super Hole-A-Matic self powered portable hole digging and tunneling machine, introduced by Eugene John Freeman & Co., Van Nuys, Calif. It replaces cumbersome, sometimes dangerous, two-men operated digging machines.

The tool digs holes at any angle from 4 to 8 inches in diameter, up to 6 feet deep with a shaft extension. For pipe installations, it will tunnel up to 12 feet deep.

Perfect for concrete pier holes and the like, the tool digs a hole in just one minute. The hardened alloy steel blades work with a pulverizing, grinding action and will not bend, break or throw the operator when obstructions are encountered. The tool chews up softer shale, rides above large rocks without damage.

Operating in any remote location from a 1.25 kw AC or DC generator, the unit is ruggedly constructed, equipped with grease-sealed ball bearings and extra heavy windings for long, durable service.

More information? Circle Item 25 on postcard, page 123

Primer for Rusty Metal

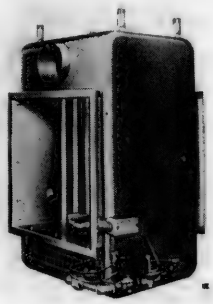
A new rusty metal primer distributed by Surface Engrg. Co., Inc., Wichita, Kan., permits application of Bakelite vinyl resin-base protective topcoatings to industrial equipment without resorting to sandblasting or other means of surface preparation. The resistance of vinyl resins to acids, alkalies, salt air and industrial fumes makes them an ideal base for industrial protective coatings.

The primer is intended only for rusty metal surfaces. It is especially useful where rust removal by sandblasting is impractical due to spark hazards, danger of contaminating nearby equipment, or the cost, time and small area involved.

More information? Circle Item 26 on postcard, page 123

Gas-Fired Duct Heaters

A completely new line of gas fired duct heaters, featuring twelve models, ranging in input capacity from 65,000 to 500,000 Btu per hour, is announced by United States Air Conditioning Corp., Minneapolis, Minn. Designated Series 23A-DU, the heaters burn all types of gas.



The heaters are designed for heating and air tempering jobs where air is circulated by an independently located blower, especially when used in conjunction with air conditioning systems. A rectangular duct flange for simple connection to inlet and outlet ducts is standard equipment.

The burners do not depend upon the remote fan for air. Variation in fan speed will not affect the burner operation. A built-in draft diverter allows the unit to be installed 6 inches from the ceiling or walls.

Controls can be wired to operate either simultaneously with the blower motor, so that the gas supply is turned on and off as the blower is started and stopped, or may be controlled by a thermostat located in the leaving air side of of the ductwork.

More information? Circle Item 27 on postcard, page 123

Adjustable V-Belt

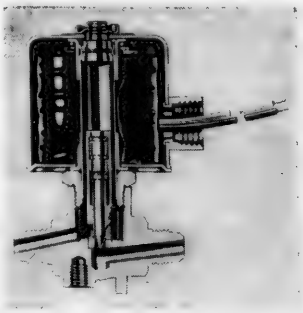
A new Veelos adjustable V-belt for D and E drives is now in production by Manheim Mfg. & Belting Co., Manheim, Pa. It is said to be the easiest V-belt to couple and uncouple ever made.

These link V-belts are made of plys of high-tensile strength canvas duck, joined by riveted studs with removable cup-washers and T-screws. This unusual construction gives great strength and durability at all key points yet enables the belts to be coupled and uncoupled easily. The belts are said to provide maximum flexibility to last longer, run cooler and smoother. Two types are available: regular rubber coated for general services and oil-proof for oily and high temperature drives.

More information? Circle Item 28 on postcard, page 123

Improved Solenoid Valve

Available in three orifice sizes and in four body styles, an improved model of its Model 73 solenoid valve is announced by A-P Controls Corp., Milwaukee, Wisc.



The new models incorporate double-dipped, varnish-impregnated coils to assure efficient performance under extreme humidity conditions. The coil is easily changed to suit voltages required for special applications. A unique feature is an electrical data plate which accompanies each interchangeable coil. When a coil is changed, the new plate is fastened under the coil cover nut, and thus the identifying data on the valve is correct at all times. The coil cover is held with one nut, and can be rotated through 360 degrees, to simplify electrical connections.

The valve is equipped with a long-life, quiet-floating plunger, and the valve needle and seat are protected against dirt by a removable, non-corrosive screen.

Designed for use with any non-corrosive liquid and for refrigerants or air, the valve may be obtained in three orifice sizes—5/32, 3/16 and 7/32 inch.

More information? Circle Item 29 on postcard, page 123

Ceiling Diffuser Damper

A new Dual-Valve damper series, for installation with the company's flush or S.D. type ceiling diffusers, is announced by Air Control Products, Inc., Coopersville, Mich.

The new valves give exact control of the air volume, plus even air distribution over diffuser face. Its design allows free, unobstructed flow of the air stream and prevents rattles and fluttering. It is easily installed to duct or blocking, and eliminates the need for installation rings.

Valve mechanism consists of spring-loaded, butterfly-type valves, operator chain, chain-lock disc, and balancing bell. Valves are opened by releasing the chain, which drops down through the center of the diffuser. Chain is held securely in place by the chain-lock disc, with its keyhole lock, which is snapped to the center ring of diffuser. Valves can be adjusted to any open position by attaching the bell to chain at the desired position.

It is available for 6 through 14 inch ceiling diffusers of either type.

More information? Circle Item 30 on postcard, page 123

Plastic Blower Wheels

Manufacturers of air conditioning and heating equipment, heaters, movie projectors and other products are offered centrifugal type blower wheels, introduced by Master Appliance Mfg. Co., Racine, Wis., under the trade name Plasturbo.

After several years of experimentation and development, the company is able to injection mold, in one piece and with hub integral, a plastic blower wheel with curved vanes. Material used is DuPont's F-10001 Nylon, which has high heat resistant and high impact qualities.

The wheels, due to the simple but unique method of molding, offer a durable, efficient and quiet operating blower wheel at a considerable savings in cost. They are available in several sizes at present with other sizes now being tooled.

More information? Circle Item 31 on postcard, page 123

Leakproof Hose for Freon

Reported as the first leak-proof flexible hose for Freon refrigerant gas, the Qua Seal hose is announced by Quaker Rubber Corp., Philadelphia, Pa.

The hose is made with a special synthetic tube which prevents permeation of this highly volatile gas. Users report the diffusion rate of Freon through the hose to be less than 5% of the rate conventionally experienced on hose.

This hose is reinforced with two layers of braided textile, and is designed to withstand the wide temperature range found on both the suction and discharge sides of the refrigerator compressor. It can be used with working pressures as high as 400 psi.

Designed especially for carrying freon gas used in refrigeration systems, the hose is also recommended for carrying lacquers, lacquer solvents, naphtha, kerosene and many chemicals. It is available in 1/4, 3/8, 1/2, 3/4 and 1 inch inside diameters.

More information? Circle Item 32 on postcard, page 123

Horizontal Unit Heater Line

A complete new line of horizontal unit heaters, designated as series 17, is announced by Fedders-Quigan Corp., Trenton, N. J. They are made in 16 models ranging in capacity from 110 to 1225 sq. ft. EDR. Ratings range from 26,400 to 294,000 Btu per hour.

Wrap-around cabinets combine handsome appearance, strength, light weight and rigid support for heating element, fan and motor assemblies.

Heating element is made of copper tubing expanded into die-formed aluminum fins. Flanged holes in fins provide substantial metal-to-metal contact with tubing for maximum heat transfer efficiency. Heating element is suspended in cabinet by brackets which provide support and also resist torsion stress during piping. Saddle type mounting permits expansion and contraction. Adjustable louvers provide directional control of heat vertically. Directional flow louvers are available for lateral control.

More information? Circle Item 33 on postcard, page 123

Adds to Vertical Pump Line

Its line of vertical self-priming pumps has been expanded up to 1½ hp, according to Marlow Pumps, Ridgewood, N. J. Nine new vertical models have been added.

These compact, low-cost vertical self-priming pumps are highly efficient and maintain their efficiency even after hard use. The diffuser design enables the pumps to prime and purge themselves automatically even on suction lifts. A self-lubricating shaft seal eliminates drip and reduces maintenance to a minimum.

The new models are available in 1½ and 2 inch sizes, with 1/3 to 1½ hp, single or three phase, open or explosion proof motors.

More information? Circle Item 34 on postcard, page 123

Power Roof Ventilator

An aluminum power roof ventilator, the Venturette, has been introduced by the Uno Ventilator Co., Malden, Mass. The package comprises a rustless aluminum ventilator, power fan, and a welded aluminum roof base of which an effective venturi section is a part.

Features include sealed motor bearings, vibration proof motor mounts, and an automatic seal preventing winter heat loss.

The ventilator is available in 4 sizes with capacities ranging from 425 to 2100 cfm at zero static pressure, and 122 to 1210 cfm at ½ inch static pressure.

Applications include space between insulated ceilings and roofs of all buildings, ventilation of schools, restrooms, garages, restaurants, kitchens, and attic ventilation of houses.

More information? Circle Item 35 on postcard, page 123

Adjustable Drafting Chair

An improved Adjustrite drafting chair is in production by Ajusto Equipment Co., Toledo, Ohio. The feature of the chair is the instant adjustment to any height, from the low to the high, without getting off the chair and without soiling the hands. Three sizes are availale in seat heights from 20 to 28 inches, 24 to 32 inches, 28 to 36 inches.

The seat and back rest are upholstered with U. S. Naugahyde in green, grey, black, brown or red. The seat pad is 2 inches thick made of 2 ply Nukraft rubberized hair and ½ inch foam rubber.

More information? Circle Item 36 on postcard, page 123

54 In. Axial Flow Fans

Two new 1 hp, 54-inch fans, delivering 25,000 cfm have been put into production by the Phil Rich Fan Mfg. Co., Houston, Tex. One is a wall exhaust fan (illustrated) for vertical use, the other an attic fan for either vertical or horizontal use.

Finished in hammertone gray, both of these fans have streamlined venturi frames for silent operation. They are rubber mounted, have sealed-for-life SKF ball-bearings, and are powered by heavy-duty G.E. motors. The fans have heavy welded construction throughout, but for their size are easy to install. A feature of both is that they move a large volume of air at a relatively low running speed. This insures silent, vibrationless operation.

More information? Circle Item 37 on postcard, page 123

Warehouse Air Conditioning

An adaptation of its Kathabar humidity conditioning equipment, designed especially for storage warehouses and war production plants placed in stand-by condition, is announced by Surface Combustion Corp., Toledo, Ohio. The new units represent an effective combination of refrigeration and chemical dehumidification. An air-cooled compressor is used. The condensing coil is located in the leaving air stream, giving the system adiabatic operation.

The new units are compact and because of the adiabatic operation work entirely on electric energy. They do not require the heating of the building to maintain 35% relative humidity, even to as low as 20 deg temperature. This new system combines the features of refrigeration and chemical dehumidification, increasing the field of application for both.

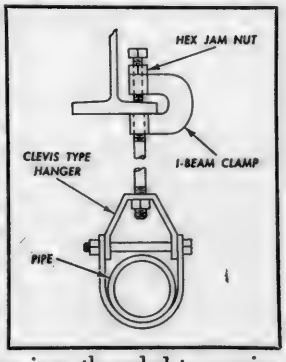
Low maintenance cost, extreme reliability and no carry-over of absorbent are some of the advantages claimed for these units. Because they employ a liquid dehumidifying agent, it is possible to handle more air for the same or less investment. Greater air circulation in the conditioned spaces is thus obtainable.

These units also offer a means of humidity conditioning underground storage spaces and mines at a much lower cost than heretofore possible.

More information? Circle Item 38 on postcard, page 123

Adjustable I-Beam Clamp

An adjustable, vibration-resistant I-beam clamp designed to handle requirements in process food and chemical, utilities and steam piping systems is announced by The Globe Stamping Div., Hupp Corp., Cleveland, Ohio.



The clamps are adjustable to various thicknesses of beams by a hardened set screw which clamps to the beam. A hex jam nut is used to lock the clamp and bolt firmly to resist vibration. The clamp body, formed of 9-gage steel, is 2⅜ inches long by 2⅜ inches wide with a ¾ inch opening to receive a variety of flange sizes. The lower clamp jaw, threaded to receive hanger rods, is available in four sizes to take ⅜, ½, ⅝ and ¾ inch hanger rods.

The clamps are made of 1040 high carbon steel, providing excellent fatigue-resistant characteristics for long trouble-free service. The clamp used in conjunction with the company's 2-section split-ring clevis-type pipe hangers is said to afford easy erection of all piping systems, simplifying maintenance or lay-out changes.

More information? Circle Item 39 on postcard, page 123

Accumulator Drier Line

Entrance into the accumulator and accumulator-drier field, with standard lines for original equipment manufacturers, is announced by Remco, Inc., Zelienople, Pa.

Both accumulators and accumulator-driers are made with spun-end copper shells, inverted openings for silver brazing being provided.

The accumulator-driers incorporate the high efficiency molded drying element, nested in fiberglas to provide cushioning against shock. A perforated retainer insures no shifting of the drying element in handling, and prevents fiberglas or dessicant from entering the lines.

Net volumes of the accumulator-driers range from 5⅛ to 36¾ cubic inches, with moisture removal capacities at 80 deg or lower varying from 53 to 252 drops of water.

Accumulators are made in a range of twelve sizes varying in volume from 6 to 40⅞ cubic inches.

More information? Circle Item 40 on postcard, page 123

Electric Blower Heaters

A new line of electric blower-type heating units is announced by The Kilbury Mfg. Co., Lawndale, Calif. Included are industrial types for use in factories, console types for use in offices and stores, and furnace types for use in homes.

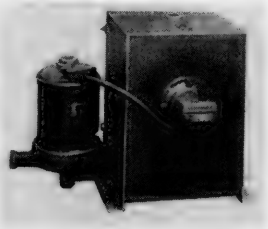
The natural tendency for heated air to rise and stratify near the ceiling is counter-acted by properly sized blowers which direct heat down to floor with sufficient velocity to overcome the buoyant effect. The velocity of the air spreads the heat along the floor where it is needed most; mixing with the surface layer of air and uniform temperature over a wide floor area results.

A brochure is offered.

More information? Circle Item 41 on postcard, page 123

Improved Condensate Pump

An improved condensate pump, designed to cut operating, maintenance and installation costs, is a new product of C. A. Dunham Co., Chicago, Ill.



Stuffing box maintenance has been completely eliminated by a new mechanical seal. Operating and maintenance costs, it is felt, will be reduced because this pump does not depend upon any close clearances to hold its nance costs, it is felt, will be reduced because this pump does not depend upon any close clearances to hold its rated discharge and pressure. New low motor horsepower per square foot of EDR also reduces operating expense.

The pumps can be installed without need for bars or bed plates. Return line connections are low so that pitting is rarely necessary. Purchase price, too, has been lowered.

More information? Circle Item 42 on postcard, page 123

Static Pressure Controls

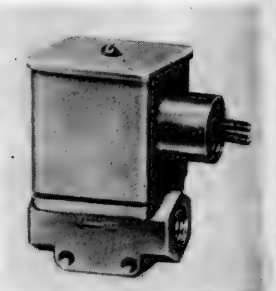
The Catalog 104 Sensitive static pressure controls, an improved version of the company's Catalog 104 controls introduced five years ago, are announced by The Henry G. Dietz Co., Long Island City, N. Y. The improved units employ new and improved parts and have a better appearance as well as longer life. It is also possible now to botain the units with silicone impregnated glass cloth diaphragms instead of Neoprene where operation at high or low temperatures over long periods of time is desired.

The controls are for application on very low pressures where regulation is required in inches of water. The units have numerous applications in air conditioning, heating, and general industry. They have found wide use in the electronics industry as safety interlocks in air cooled equipment.

More information? Circle Item 43 on postcard, page 123

Midget Solenoids for Burners

Midget solenoid valves, no larger than two packs of cigarettes, have been developed by General Controls Co., Glendale, Calif. This new series of magnetic stop valves is designed for use with all types of gases and fluids. The valves operate in any position and feature positive shut off, low current consumption, optional time-delay, and adjustable by-pass and main flow.



The K-28 model is designed specifically for use in domestic oil burners. A built-in, time-delay action prevents immediate opening of the valve until the oil burner motor gains full running speed. This assures proper fuel-air ratio and normal combustion. When the motor circuit breaks, the valve closes instantly to prevent oil dribble. These factors reduce smoky starts, lessen accumulation of carbon on the nozzle and electrode, and help eliminate start-stop oil odors.

Another valve in this midget series is the K-28, for use in both domestic and commercial oil burner installations. It is of the manual reset type and dependable safety is featured in the valve. The K-29 fails safe on current failure or unsatisfactory voltage conditions, and must be manually reset after the trouble is corrected.

More information? Circle Item 44 on postcard, page 123

Fractional Horsepower Motors

Announcement that it is now producing fractional horsepower motors in the rerated design is made by Century Electric Co., St. Louis, Mo. These new motors, known as Form F fractional horsepower motors, combine all of the desirable features associated with the company's designs, together with new techniques which permit more horsepower in smaller frames with the same standards of performance and dependability.

The motors are available as: Type SP split phase single phase induction motors for general purpose applications where the load is easy to start and easy to pull up to speed; Type CS, capacitor start single phase induction motors for hard to start applications such as pumps and compressors; Type SC, squirrel cage polyphase induction motors for all general purpose applications. Bulletin 1-5, Page 1, is available.

More information? Circle Item 45 on postcard, page 123

Low Cost Time Switch

A quality time switch, the Type B, at a low price is being produced by Sangamo Electric Co., Springfield, Ill. It is a NEMA Standard 30 ampere rating, single-pole, single-throw switch that employs the same slow-speed hysteresis motor and synchronous timing mechanism used in this manufacturer's line of heavy-duty time switches. The entire mechanism is enclosed in a sturdy gray steel case with a hinged cover and sealable hasp.

The switch measures 4¼ x 7¼ x 3⅛ inches overall. Ample space for wiring, four convenient multiple knockouts, and a keyhole mounting slot permit fast, labor-saving installation.

Heavy silver contacts, insulating safety shield, four levers for two *on* and two *off* operations, and easily manipulated trippers, are additional features. List price is $13.50, and the switch carries an 18-month guarantee. Catalog Sheet 1020 is available.

More information? Circle Item 46 on postcard, page 123

Automatic Control Valve

A line of high capacity automatic control valves has been developed by Controlled Flow Valve Co., Kansas City, Mo. The Controlled Flow valve was designed primarily for the safety and relief valve field but it can easily be adapted for almost all liquid and vapor control services by changing only the external actuating equipment.

The basic valve utilizes a body design and operating principle which allows high flow capacities under actual flow tests. The valve has angle body design and is available in 2, 3, 4 and 6 inch sizes for pressures ranging from 3 ouces per square inch to 150 psi. It is extremely simple and durable. The valve has only one moving part and uses no large springs, moving pistons, stuffing boxes or close-tolerance guides.

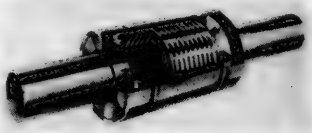
The valve can be opened and closed manually and automatically either at the valve or at a remote location. The valve can be pneumatically, hydraulically or electrically operated from a remote location. It is easily adjusted and tested. The external actuating equipment can be removed for calibration and repair or can be replaced without removing the basic valve.

A high capacity pressure relief valve was specifically developed for the low pressure field, 3 ounces per square inch to 15 psi. This valve has wide application in the chemical storage field and petroleum products.

More information? Circle Item 47 on postcard, page 123

Expansion Joint for Baseboards

A new expansion joint, especially designed for use in its baseboard heating system and Tru-Perimeter heating installations using Walvectors, is announced by Warren Webster & Co., Camden, N. J. It is available in ¾, 1 and 1¼ inch sizes. Each size provides for ½-inch movement.



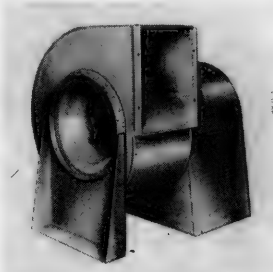
Known as the Webster Tru-Perimeter expansion joint, it is cylindrical in shape with dimensions kept so that it will fit behind baseboard enclosures. It is designed for sweat connections. Each joint is packaged separately in a sturdy cardboard tube.

A 4-page bulletin, B-1620, gives complete details.

More information? Circle Item 48 on postcard, page 123

Compact Ventilating Sets

A new line of all-purpose ventilating sets is available from Westinghouse Electric Corp., Sturtevant Div., Hyde Park, Boston, Mass. The sets consist of fan, motor and drive in a single package.



In two series, a wide range of capacities are covered by the line. The 900 series is direct-drive from fan to motor, six different sizes giving an air volume range of 200 to 3200 cfm capacity. Featuring an adjustable v-belt drive, the 12 sizes of the 1000 series give capacities from 375 to 14,400 cfm.

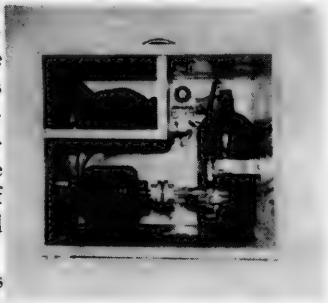
Compact designs, from 54 by 67 by 58 in. for the largest model down to 10 by 12 by 18 in for the smallest, make these sets ideal solutions to unusual ventilation and exhaust problems.

Where outdoor mounting is desired, weatherproof covers are available. Direction of discharge may be adjusted for ease of field installation.

More information? Circle Item 49 on postcard, page 123

Periodic Effluent Sampler

An effluent sampler which takes samples periodically from streams, rivers or process lines, for compositing and analysis, is announced by Compact Air Samplers, Demarest, N. J. Mechanical sampling in this manner is more dependable because the time cycle is more precise and the volume of each sample is accurately controlled. The only time required of personnel is that involved in changing receivers.



The sampler possesses compactness and portability, and weighs 45 pounds; simplicity in manipulation; has self-priming pump, lifts liquid to height of 6 feet; and has easily regulated by-pass feeder.

The effluent sampler comes equipped with pump and motor, electric timer, compositing bottle, 50 feet of electric cord, electrical accessories, and plywood case. Motor operates on 110 volt A.C.

The sampler is designed to transfer controlled samples of liquid every 15 minutes into a large receiver. Once the instrument has been set up, it will continue to take samples in this manner until the electrical current is turned off. This continuous operation means uninterrupted sample collection for many days if necessary.

In operation, the instrument is stationed near the stream or process line from which samples are to be taken. Proper connections, consisting of pipe, plastic or rubber tubing are made between the pump and the sampling point. The volume to be fed into the receiver is then determined from the volume required for analysis and the duration of time in which samples are to be taken. Regulation of the by-pass feeder does the rest.

More information? Circle Item 50 on postcard, page 123

Enables Waterleg Inspection

A new base for waterleg type boilers has been developed by Plibrico Co., Chicago, Ill. Reports indicate that this base, known as the Inspecto Base, overcomes the major problems which attend ordinary bases for the waterleg type boiler.

With ordinary boiler bases, the entire under surface of the waterleg rests on masonry, hidden from view. Consequently, while it is subjected to external corrosion, it cannot be readily inspected; with the new base, this under surface is exposed at all times. Being exposed, it can easily be inspected at any time, and air can circulate about it freely, preventing external corrosion due to moisture.

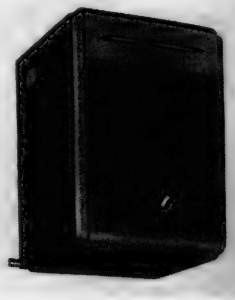
Constructed of steel, the base is shop fabricated and can be assembled by two men in less than an hour. Thus boiler and base can be assembled the same day. Leveleg supports are a feature which permit simple and positive leveling of the boiler.

Bulletin Form 62 is available.

More information? Circle Item 51 on postcard, page 123

50,000 Btu per Hr. Gas Heater

Addition of a 50,000 Btu per hour fully automatic unit heater to its line of gas-fired heaters is announced by Automatic Heating Equipment Div., Utility Appliance Corp., Los Angeles, Calif.



Planned especially for use in smaller shops and stores, this Model 50 heater is compact and attractive. Only 23 inches high, it was engineered for suspension from the ceiling, leaving valuable floor and wall space free for the display and selling of merchandise. Its 24-volt control eliminates the necessity of running thermostat lines in conduit.

Efficient operation is assured by the corrugated heat exchanger, which is porcelain coated for corrosion resistance. Heat direction may be easily controlled with the large, adjustable louvers. Summer switch provides air circulation for warm weather ventilation. Quiet operation results from the slow speed motor and resilient hub fan.

The unit is approved by AGA, and is available for use with natural, manufactured, and liquefied petroleum gases.

More information? Circle Item 52 on postcard, page 123

Portable Drawing Board

A portable drawing board, molded of clear polystyrene plastic, for engineers, draftsmen, and contractors, is available from The Graphostat Co., East Orange, N. J.

Made of durable, transparent plastic it weighs less than 8 ounces and can be slipped into a briefcase. Four corner clamps for attaching 8½ x 11 inch paper assure smooth, sure handling of the working sheet without the use of thumbtacks or scotch tape. The clamps are recessed into the plastic so that a triangle or ruler can ride freely over them without interference.

Two metal straight edges, one horizontal, one vertical, are retractable, thus making it possible to do precision work without the use of a T-square. Tension clamps on the under side of the board provide for secure storage of triangles.

The board measures 9¾ x 12¼ inches, is excellent for tracing or shadow box work, and retails for $3.95.

More information? Circle Item 53 on postcard, page 123

ANOTHER CASE OF

Copper

WHERE IT COUNTS

4,800 FEET OF TYPE "L" REVERE COPPER WATER TUBE, IN SIZES FROM 1" TO 6" USED IN AIR CONDITIONING SYSTEM OF U. S. Fidelity and Guaranty Company Bldg. Baltimore, Md.

Take a good look at the two photographs below. Then visualize this same installation made with threaded fittings and think of the time that would have been consumed running these lines. No wonder more and more copper tube is being used for air conditioning, water and waste lines.

You don't have to worry about wrench room in the tight corners, solder joints are made much faster, present a much cleaner appearance. And you need never worry about replacing copper tube due to rust, for copper can't rust. There is no loss of flow or pressure, no allowance in pipe size need be made for rust accumulation with Revere Copper Water Tube. There are fewer fittings, too, on the long runs, as Revere Copper Water Tube comes in straight lengths of 20' in hard and soft tempers and 60' coils in soft temper. It's easy to bend, too.

Keep out of trouble, protect your reputation for quality work, with copper. Use Revere Copper for air conditioning lines, radiant panel heating, hot and cold water lines, underground service lines, waste stack and vent lines, processing lines. See the Revere Distributor nearest you today. And, if you have a technical problem, he will put you in touch with Revere's Technical Advisory Service.

REVERE

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Founded by Paul Revere in 1801

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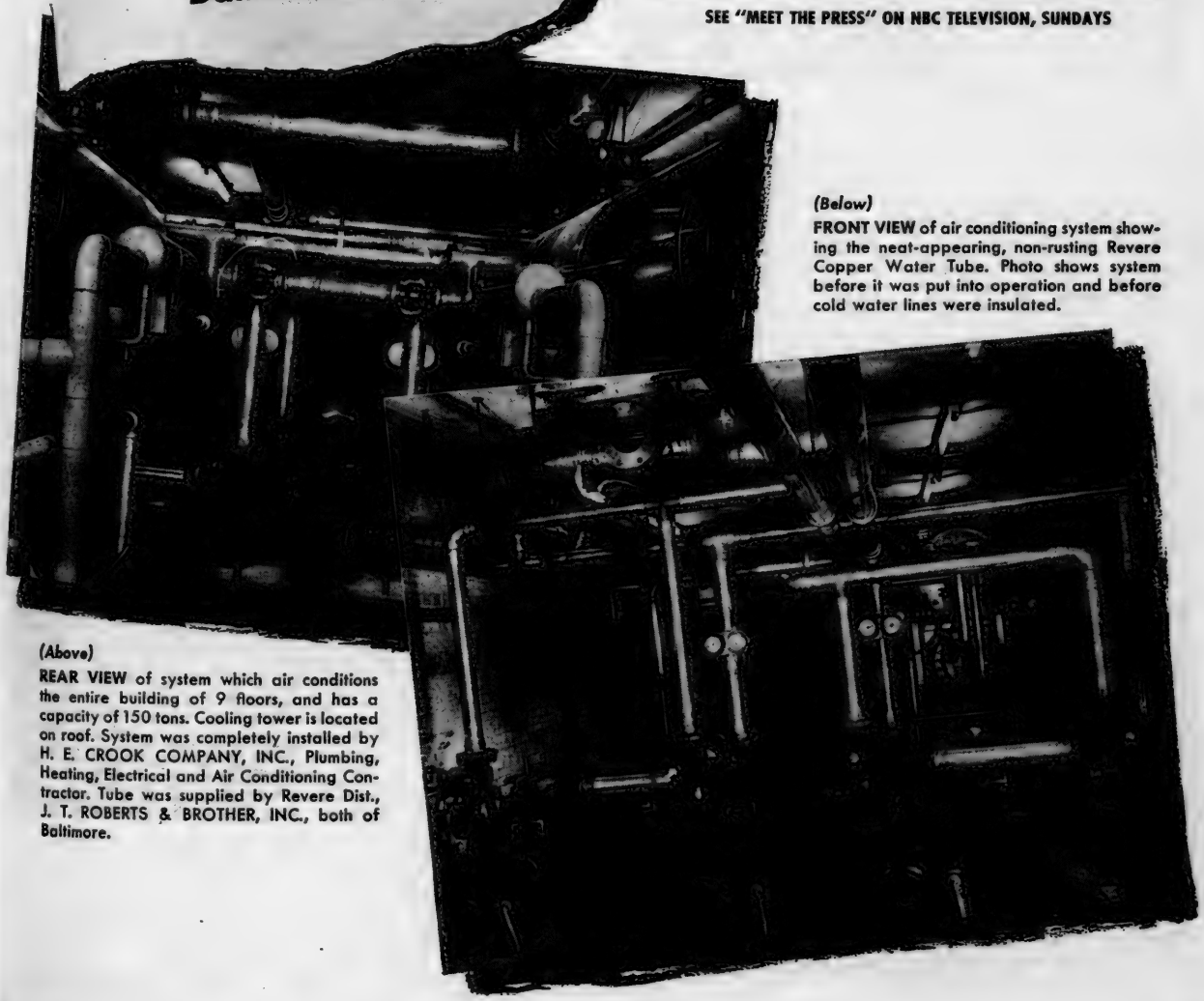


(Below)

FRONT VIEW of air conditioning system showing the neat-appearing, non-rusting Revere Copper Water Tube. Photo shows system before it was put into operation and before cold water lines were insulated.

(Above)

REAR VIEW of system which air conditions the entire building of 9 floors, and has a capacity of 150 tons. Cooling tower is located on roof. System was completely installed by H. E. CROOK COMPANY, INC., Plumbing, Heating, Electrical and Air Conditioning Contractor. Tube was supplied by Revere Dist., J. T. ROBERTS & BROTHER, INC., both of Baltimore.

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

Far-Infrared Dries Metal Parts

PROBLEM: A manufacturer of metal products in Wayne, Michigan, required a system for drying pressed steel fittings after washing and bonderizing. An existing system used an infrared tunnel in which water splatter and occasional mechanical contact with work caused lamp breakage. Lamp radiation could not be controlled except by changing to lamps of different wattage.

SOLUTION: An all-metal Chromalox far-infrared tunnel was placed in operation. Twelve 1800-watt metal radiant heaters were arranged to focus intense heat on the work. Six heaters on each side were located on 8-inch centers and enclosed by insulating panels with an inner lining of reflective aluminum sheet. An input regulator controls heat to the varying work load.

RESULTS: Approximately 3,000 pounds of steel stampings are speeded through the oven per hour at a maximum conveyor speed of six feet per minute. Heat is controlled in accordance with size of metal parts being dried without changing the heating elements. Minimum floor space is required because intense far-infrared heat is concentrated in a small area. Metal construction of heating elements reduces breakage.

Insulated Ductwork Reduces Fire Hazard

PROBLEM: At the new Carlton House, the successor to New York City's Ritz-Carlton, exhaust ducts serving range hoods were judged a fire hazard. Grease vapors condensed on the duct interior and cleaning was a difficult operation.

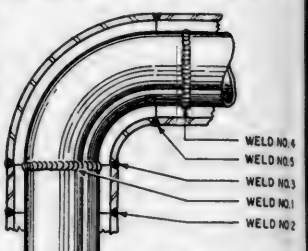
SOLUTION: The duct was insulated with blocks of 85 per cent magnesia, 1 inch thick, secured by 16-gage annealed iron wire. Hexagonal wire mesh was then stretched over the blocks and ¼ inch layers of asbestos hard finished cement were troweled on. A canvas jacket completed the application.

RESULTS: Temperature of exhaust gases is raised sufficiently to prevent condensation on duct walls, thus reducing the danger of flash fires.

How to Make and Install Jacketed Elbows

PROBLEM: A simple and relatively easy way was required for using welding fittings for directional changes in jacketed piping systems.

SOLUTION: A fabrication procedure was developed by the engineering service division of Tube Turns, Inc. The jacketed fitting combination consists of long and short radius 90-degree elbows, with center line radii closely matching. On one end of the inside elbow is a tangent that extends beyond the corresponding end of the outside elbow. On the other end of the inside elbow, a short piece of pipe is attached to facilitate the installation. Welding sequence shown in the accompanying drawing must be followed exactly.



RESULTS: This type of jacketed fitting lowers fabrication costs and eliminates the need for steam or coolant jumpers bypassing elbows. It permits more accurate temperature control since there are no concentrations of metals to cause overheating or undercooling, as when flanges are used. Optimum flow conditions are maintained. Insulation can be readily and permanently applied.

Roof Ventilator Serves Dome

PROBLEM: Upon completion of construction of the Ford Motor Company's remodeled rotunda building, heating and ventilation of the geodesic dome presented a unique problem. The dome is of light weight construction covered with plastic. No interior trusses were available for support of heavy ventilating equipment, and the high dome created a pool for the accumulation of warm air.

SOLUTION: A DeBothezat Power-Flow roof ventilator was installed in the top of the dome. The ventilator was especially constructed of aluminum to save weight and to match the framework of the dome. A 36-inch fan wheel exhausts 5,000 cfm of air at low speed and 8,000 cfm at high speed.

RESULTS: A stream-lined unit in harmony with the architecture of the dome was installed. Aluminum construction of the unit allowed installation without internal supports.

Adjustable Framing System Supports Tunnel Piping

PROBLEM: In a tunnel for the new Joint Sewage Treatment Plant serving the twin Michigan cities of Benton Harbor and St. Joseph, several tons of piping had to be supported overhead and along the sides of the tunnel.

SOLUTION: A system of piping suspension known as Unistrut was installed. Along the sides of the tunnel, the Unistrut framing system was used consisting of steel channel members manufactured in modular units complete with pipe rollers, brackets, clamps, and fittings which are bolted together to form a framework of mechanical supports. The overhead system consists of concrete inserts which are steel channels embedded in the concrete ceiling and holding pipe hangers. In one area, over 20 tons of overhead piping was supported by inserts and hangers. The job was engineered and erected by The Silvis Co., Sheboygan, Wis.

RESULTS: Since the supporting system is adjustable, the pitch of the piping can be set exactly as the installation proceeds, and changes or additions required at any time can be made without redesigning the supporting system. Engineering detailing and special erection equipment is reduced to a minimum, and assembly is accomplished without drilling or welding.

Well Water Serves Cooling and Heating System

PROBLEM: The Florida Power Corp. decided to extend its air conditioning system from an original installation covering only the first floor commercial office to the remainder of an eight-story building using a heat pump. Heat source and sink was to be well water. The original system included two wells, each equipped with Deming jet pumps. Each pump obtained water from a 300-foot, 6-inch diameter well. Both pumps discharged into a 6-inch disposal well. Additions to the system would add 14 heating and cooling units of various sizes scattered over eight floors of the building. Peak water requirement was to be 576 gpm with instantaneous demands controlled thermostatically down to a minimum of 20 gpm. Head requirements varied from 40 feet to 180 feet.

SOLUTION: An engineering survey preceded the decision to design and operate the water system in three parts; the primary supply, the circulation, and the disposal. A 12-inch well was drilled to a depth of 300 ft and a 20-hp Deming vertical turbine pump having a capacity of 600 gpm was installed. Water is pumped into a 10,000 gallon underground steel storage tank adjacent to the pump. Pump operation is controlled by a float switch set to maintain water level at the proper height. A 6-inch main runs from the storage tank to a basement pump room housing the circulating pumps. Four circulating pumps, each connected to the supply main, serve a group of heating and cooling units. In the disposal part of the system, all units discharge into a common return main connected to three old six inch wells which dispose of the water. On the cooling cycle, the water leaves the ground at 80F and returns at 95F. On the heating cycle the entering temperature is 80F and the return temperature is 70F.

RESULTS: After several months of operation, the owners report complete satisfaction with the cooling and heating system.

School Invests in Clean Air

PROBLEM: Coal smoke from nearby residential and commercial users was causing irritating and unhealthful conditions in the classroom of Brown Junior High School in Cambridge, Ohio.

SOLUTION: Trion Electronic Air Cleaners were installed to clean ventilation air to the 20 classrooms in the school.

RESULTS: Because the recirculated inside air is constantly being cleaned by the Trion equipment, less outside air is now introduced into the system. Formerly using 100% outside air, this has now been successfully reduced to 60%. Thus, during cold days less outside air need be heated. Mr. Dale Thomas, superintendent of buildings, estimates that, "during the past mild winter, a saving in heating costs of 25% was realized. During a cold winter, a saving of about one-third may be expected." Savings in heating cost alone are paying for the Trion equipment.

Climate Controlled in Flight Simulator

PROBLEM: In an electronic flight simulator manufactured for the U. S. Air Force by the Electronics Division of Curtiss-Wright Corp., conditions were required to simulate those of the flight deck of the huge 200-passenger Douglas Globemaster. Long training stretches in the simulator make air conditioning advisable for crew comfort.

SOLUTION: A Worthington 3-ton SCY-351 packaged air conditioner was provided and operated through a remote control system.

RESULTS: Sustained periods of training can be endured by crews in the simulator cockpit. All flight conditions are realistically reproduced so that crews get the perfect sensation of actual flight.

The Parker Pen Company's new Arrow Park plant at Janesville, Wis. Architects: John J. Flad & Associates, Madison, Wis. Mechanical Engineers: Beling Engineering Consultants, Moline, Ill. Heating Contractors: Hyland Hall Co., Madison, Wis.

How Honeywell Customized Temperature Control can help you

Give your clients the "working climate" they've always wanted

Why Honeywell Customized Temperature Control is becoming a must for all types of buildings

"Working climate," as important to the success of your clients' business as black ink in the ledger, is made up of a lot of things.

The handling of personnel, proper lighting, vacations with pay, temperature and humidity control are a few of them.

And the best way to provide proper temperature control is through use of *Honeywell Customized Temperature Control.*

The key word here is "customized." It means that whatever your clients' control requirements, a Honeywell Customized Temperature Control installation, *designed to fit the needs of the building and its occupants* is your answer. This applies not only to heating and cooling, ventilation and humidity control, but to industrial control as well.

Only Honeywell can provide true "customized" control. Because only Honeywell manufactures all three types of controls—pneumatic, electric and electronic—which often must be integrated in a single building to give you the right performance.

The story, in capsule form, of the Honeywell Customized Temperature Control installation in Parker Pen's new plant in Janesville, Wisconsin, is told by floor plan and picture captions opposite. They tell how specific occupancy, use and exposure problems were met—to provide an ideal "working climate."

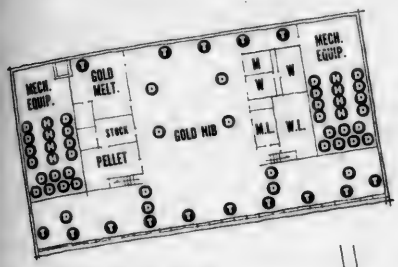
The *techniques* used, applied to your particular problems and the problems of your clients, can help you give your clients even better performance by providing the "working climate" they've always wanted.

For comfortable, even temperature in new or existing buildings—of any size—use Honeywell Customized Temperature Control

Whether it's an office, motel, airport, hospital, apartment, church, school, factory, store, garage—or any size building—new or existing, Honeywell Customized Temperature Control can help meet your clients' heating, ventilating, air conditioning and industrial control problems.

Your clients will not only enjoy more comfort and efficiency, they'll save fuel, too.

For full facts on Customized Temperature Control, call your local Honeywell office. Or mail the coupon.



SECOND FLOOR PLAN

FIRST FLOOR PLAN

Philip Hull, manufacturing vice-president, the Parker Pen Company, says

"When we planned our new Janesville plant we wanted it to be the best plant of its kind ever built. Certainly the ideal indoor climate Honeywell Customized Temperature Control helps provide has aided us in approaching that goal."

MINNEAPOLIS **Honeywell**

First in Controls

104 OFFICES ACROSS THE NATION

Strategically located thermostats guard the comfort of workers in the large engineering and process room. Sunshine entering through the big windows could upset the comfort balance in summer as well as in winter—if Honeywell Customized Temperature Control weren't on the job controlling both heating *and* cooling.

"Working Climate" problems are different here. The room is huge; physically more active workers find their best room temperature is lower than in the engineering room. But Honeywell Customized Temperature Control—with thermostats strategically located in the area—easily handles this occupancy and use problem, at the same time compensating for different exposure problems.

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Dept. HV-1-07, Minneapolis 8, Minnesota
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Experience is my Classroom

By T. W. REYNOLDS

• FLASH AT TRAPS

Within the usual heating system, neither the thermostatic, float or bucket type trap will, as a general rule, pass more steam than the bare or insulated return can condense when traps are properly maintained. It is quite common to think otherwise and for this reason a table is presented for the more usual conditions. It may also be said that while bucket traps are seldom used on radiators, they sometimes are placed at the ends of steam mains. If not maintained, they can pass considerable steam, although the quantity passed may be no greater than the aggregate of poorly serviced thermostatic traps on the many radiators.

In this table, columns 4 and 6 give the difference per pound in heat of liquid at trap discharge and the pump vacuum for two types of traps at given conditions. These figures divided by the latent heat of that vacuum give the per cent of flash per pound of condensate as tabulated in columns 5 and 7.

The heat dissipated by the returns, columns 8 and 9, more than offsets the flash that would otherwise occur. Figures given are based on the average temperature from trap discharge to the pump since the vacuum will not be the same from pump to ends of system. The figures are further compensated by 2% in the coefficient of transmission for each 10F variation from standard temperature difference of 145F in 70F air.

It takes 4 sq ft of equivalent direct radiation at a transmission of 240 Btu per hour to condense one pound of steam having a latent heat of 960 Btu. Therefore, with the customary piping tax of 25% (mainly in the bare returns), there will be one square foot of equivalent direct radiation in the returns to dissipate 240 Btu for each pound of condensate passed.

Because of these assumptions, made in accordance with standard practice, the figures in columns 8 and 9 should in reality be raised to 240 Btu. This is unnecessary, however, in so far as proving enough heat loss to offset flash, since even with a reduction of 60% to give a piping tax of only 10% there will still remain more heat dissipation than required at the most extreme conditions. Furthermore, if the returns were entirely insulated, so that heat dissipation would only be about one-third and piping tax about 8%, there would yet be sufficient heat dissipation.

It can be seen from the table that bucket traps flash slightly more steam than do thermostatic traps, particularly at high pressures and vacuums, but if this heat is lost to the heated structure where wanted and does not locally overheat, nothing is wasted. The additional flash that is occasioned is to some degree offset by the greater heat dissipation (see column 9) of the returns in passing condensate at higher temperatures.

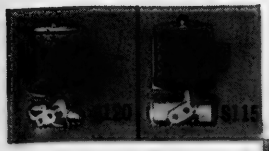
It will further be seen from the table that the thermostatic traps also flash steam and that this increases with higher pressures and vacuums. Another point is that the full choking effect of flash at any trap discharge will not be realized because the return line vacuum will be not as great at the trap as it is at the pump.

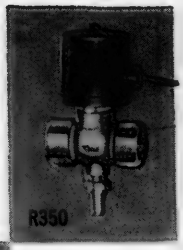
Although the table is representative of conditions likely in heating systems, the more usual condition is given on the first line where steam pressure is 1 psig and vacuum

(*Continued on page* 114)

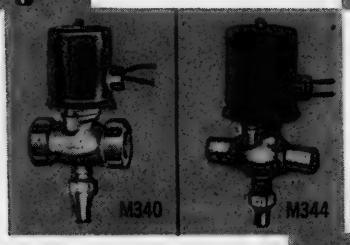
HEAT LOSS FROM BARE RETURNS OFFSETTING FLASH FROM CONDENSATE

Steam Pressure at Trap, psig	Temp. Differential Across Thermostatic Trap, F	Return Vacuum, Inches	Steam Flashed at Trap per Pound Condensate Passed				Heat Loss per Hr per Sq Ft Bare Return, Btu	
			Thermostatic		Bucket		Thermostatic	Bucket
			Btu	Per Cent	Btu	Per Cent		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	25	10	—2	0	23	2.3	194	217
1	10	10	13	1.3	23	2.3	206	217
5	25	10	10	1.0	35	3.5	203	230
5	10	10	25	2.5	35	3.5	221	230
1	25	20	29	2.9	54	5.4	165	191
1	10	20	44	4.4	54	5.4	180	191
5	25	20	41	4.1	66	6.6	174	204
5	10	20	56	5.6	66	6.6	201	204





ALCO SOLENOID VALVES



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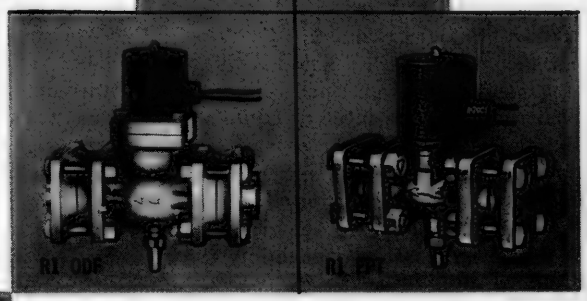

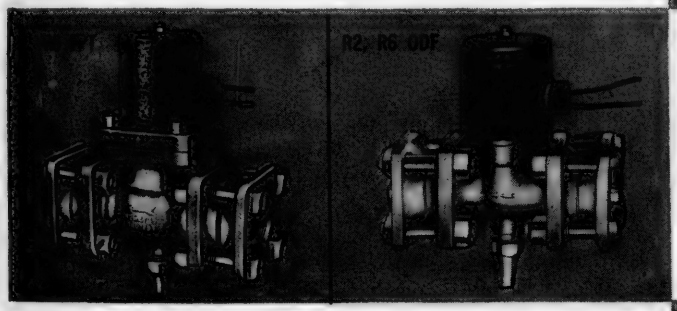

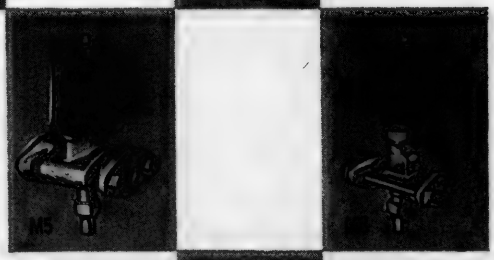

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(*Continued from page* 112)

10 inches at the pump with a 25F differential across the thermostatic trap. For this particular case, 23 Btu are flashed per pound of condensate passed by the bucket trap, but the table shows that there is as much as 217 Btu of heat dissipation in the returns to eliminate the flash in that pound of steam.

Summing up, it seems that in as far as trap selection might be made to avoid troublesome flash in vacuum returns, it matters not which type of trap is used. Flash is much more likely to be too abundant due to failure to service traps.

• ADDED SPACE FOR EQUIPMENT

One trouble with air conditioning is that there are so many ways of accomplishing results which are substantially equal. I suppose it is only human to feel that there is only one best way. Perhaps the most important way to the dealer or engineer is to find a way to fit air conditioning equipment into an existing structure.

Many forget about the possibilities of adding a mezzanine floor and selling the owner the improvement as a good way to get motors off the working floor and to add storage and office space. Air conditioning equipment can be suspended from this mezzanine. Of 100 manufacturers interviewed, 70 said they needed more space and 23 of these said they could do it by adding mezzanines and balconies.

Space is saved at Lockheed Aircraft Corp. by elevating supervisory offices on small columns to clear machinery. Sometimes a spare piece of equipment gives undue protection considering its cost and the space it takes. As time goes on its use is never found necessary, so the dead space could be converted to live space.

Another tendency in the design of industrial plants is to provide too much flexibility in equipment by way of added units of small size, each of which may require as much working area around it as a large unit. Larger units would give more output for a given floor area and total less cost for units and connections. For the same output it would reduce the floor area, thus saving building cost as well as initial and operating costs for heating and air conditioning.

• SYNTHETIC PERSPIRATION

Temperature shock is a thing about which we hear less today. Research says there is no such thing for any sex or age. The skin temperature of a women entering a hot area rises more rapidly than that of men, but this is necessary for heat relief since women do not start to perspire as quickly. In industry, perspiration from the hands of a worker can do damage by removing paint and corroding the hardest metal. To lessen this damage, Minneapolis-Honeywell Regulator Co. experiments with its own artificially produced perspiration consisting of salt and three acids—butyric, valeric and acetic.

Perspiration is an electrolytic solution which can damage precision equipment in 24 hours. Its corrosion properties varies with diet, nationality, the individual from day to day, and whether the person is a red head, blond or brunette. It is most active in the spring and fall. Socony-Vacuum Laboratories, Brooklyn, N. Y., have three different synthetic perspirations which they apply to all kinds of metal plates as a check on corrosion rates for the development of suppressants. These perspirations were originated from compounds of lactic acid, urea, salt and water.

• SOME NEW THINGS IN REFRIGERATION

Frigidaire has a new machine which makes 5/8-inch ice cubelets said to cool faster, yet last longer than ice that is crushed, chipped or flaked. Activated carbon is finding increased usage in cold storage to prevent foods from absorbing flavors from other foods. A new cold room paint, Koch Supplies, Kansas City, for use down to —50F is another means for preventing contamination of food products. This paint, it is said, dries quickly and without odor, and therefore can be applied without removal of food from cooler and locker rooms.

To avoid possible damage from the freezing of earth below the floor insulation of low temperature rooms, Beare Ice and Coal Company of Tennessee have installed ventilating systems below the floor. Thermocouples buried in the soil keep them informed as to the temperature of the soil.

• NEW HEATING PRODUCTS AND METHODS

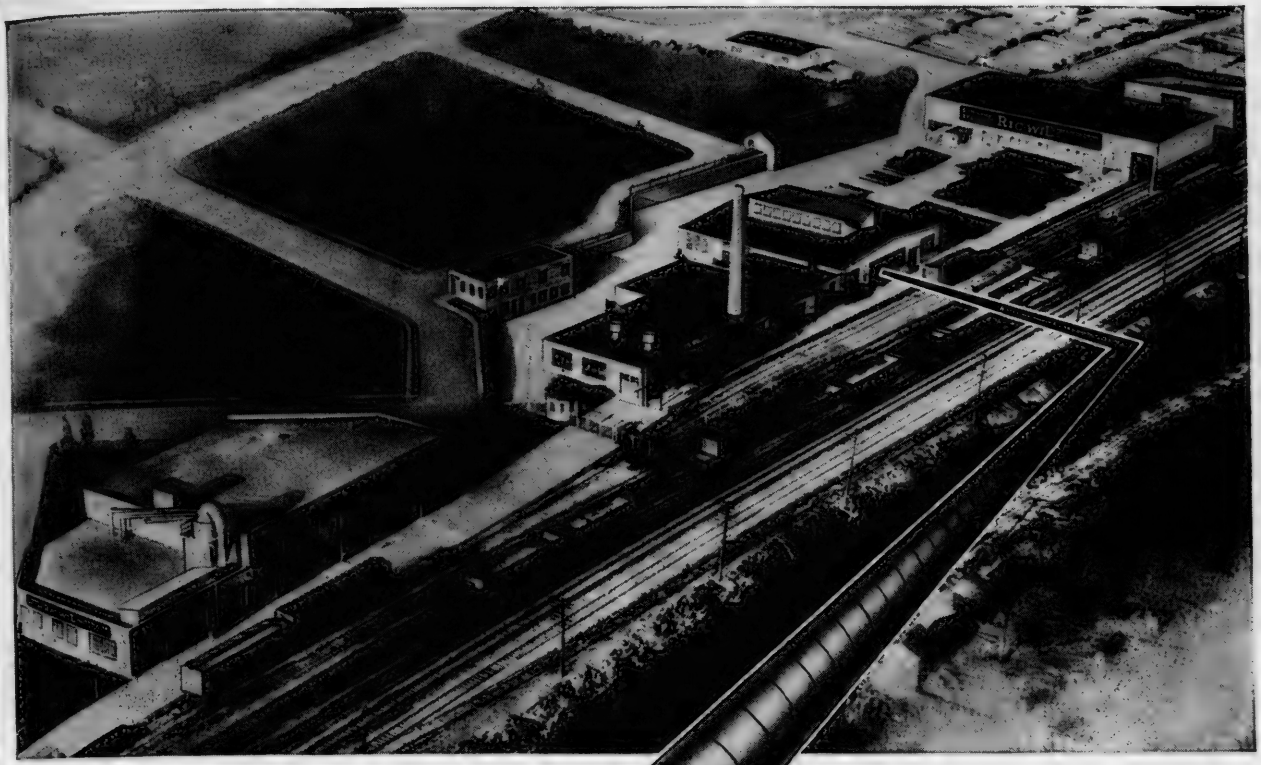
An air vent valve for hot water heating systems made by Keeney Mfg. Co., Newington, Conn., can be automatic or manual if and when desired. A slight turn at the valve does this. Also for use with hot water heating is the Econo Products Co. circulator, designed so that the entire pump assembly can be easily set at any angle, as well as the usual horizontal or vertical positions. Another development for hot water is an expansion joint to eliminate any noise due to rapid circulation of hot water in the baseboard system. It is made by General Automatic Products Corp., Baltimore, Md.

A gas-fired hot water heater so small it can be mounted on the wall is made by Southern Heater Co., Inc., New Orleans, La. It is a continuous flow or instantaneous type. Since is operates only when a faucet is open there is no storage tank and no standby losses of gas and heat.

Reference to a gas-fired device brings to mind the recent findings on the best method of gas venting. It has been found that an oval vent does about as much venting as a round one of equal area, at the most about 5% less than the round one. This slight difference is due to a slight increase in the heat loss and also the resistance of the greater surface area of the oval vent.

Reclamation of heat otherwise wasted in the smoke pipe is an old idea, but not so when a fan is applied and the heat as reclaimed is discharged directly to warm the basement or adjacent recreation room. One can find out all about it by writing Ken Swift, Factory Representative, Lepick Heater Co., McClure and Dearborn Sts., Aurora, Ill. A tubular heat exchanger (Lepick Heater Co., Aurora, Ill.) fits smoke pipes of 4, 6 and 8-inch diameter and has a built-in self cleaner. The fan may be controlled thermostatically by the temperature within the smoke pipe or by the blower control on the furnace.

(*Continued on page* 116)



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(*Continued from page* 114)

A radiant heated bench for keeping football players warm on the sidelines has been developed by Lee-Don, Inc., Pittsburgh, Pa., using Heatcrete, a product built by Perlite Manufacturing Co., Carnegie, Pa. Heatcrete has high thermal conductivity, so it allows a thin heating surface panel to be used with electrical resistance wire. Players from the warmed bench get off to a better start and it is said with less injury. The company points out that existing stadiums can have hot water radiant heat outdoors since radiant heat does not warm the air. Portable or sliding side walls are a help in such cases. All of which reminds me of Herbert Hoover, who although a mining engineer, made use of radiant heating. He lighted candles beneath a steel wheelbarrow in which he could curl up while waiting at a damp wet mining level for the smoke of blasting powder to clear.

Leaks in radiant heating systems can be stopped by a boiler solder seal (Radiator Specialty Co., Charlotte, N. C.) which will seal leaks in copper and cast iron without clogging. International Nickel Company, Inc., New York, N. Y., has a product called Inco Nickel for use in welding a boiler break or cast iron machinery. E. I. du Pont de Nemours & Co. also points out that Freon 12 is an excellent leak detector since it will escape through the finest openings and can be easily located in the usual way with a gas-burning torch or an electronic device.

Cleaver Brooks Co., Milwaukee, Wisc., has a combination gas and/or oil-fired boiler which provides by selector switch and fuel supply valves, a quick change over to suit utility demands. Portmar Boiler Co., Inc, Brooklyn, N. Y., has a new split steel boiler to go through small doorways. The Trane Co., La Crosse, Wisc., extends the window unit ventilator method of heating and/or ventilating by means of attached ducts along outside walls of school rooms. The ducts and their unit have grille outlets. The idea is to provide quick heating pick-up in the morning and also to prevent overheating after the sun is out, by distributing heat and ventilating air all around.

The Roman Catholic Church of Christ the King, Seattle, Wash., is a modern departure in the way of churches since it is circular with none of the audience more than 50 feet from the altar. Primary heating being by radiant heating from the floor, the floor temperature must be increased as the outdoor temperature decreases. Therefore, unless the room temperature is suitably decreased to meet this condition, comfort will be decreased.

There may even be more heat from convection than by radiation since the air picks up a certain amount of heat from the floor and other surfaces warmed by radiation from the floor panel. Mechanical ventilation overcomes convective currents and makes the air go where it should. For all of these reasons a large Trane Climate Changer was installed in a room over the choir.

Recently a 25,000 gal buried oil tank collapsed at a warehouse of the International Harvester Co. in a suburb of Chicago. However, without removal of the tank or delay of plant operation, the shell was gradually expanded back in place by a 40 psi hydraulic pressure. The ends were held by the clay fill in which the tank was buried. Quite a saving in money was made by using this novel method.

Pipes for heating or other purposes can be readily identified by adhesive markers. Westline Products Div., Western Lithograph Co., Los Angeles, Calif., has them for sale in clear wording and various colors, as well as in various descriptions or to suit specifications. They are made in sizes to suit the usual pipe diameters. Just wrap the marker around the pipe. No moistening is required. The markers are suitable for use indoors or outdoors.

A portable contact pyrometer gives instantaneous temperature readings of steam traps, motor bearings and any surface whether metallic or otherwise, stationary or revolving, flat or curved. It was developed by Illinois Testing Laboratories, Inc., Chicago, Ill.

To hang the pipe there is a perforated pipe hanger that needs no bolts and nuts. It can be wrapped like tape around the pipe (Tab-Tape, Inc., Santa Monica, Calif.) A plastic film is made by Minnesota Mining & Mfg. Co., St. Paul, Minn., to wrap or quickly join two air ducts without screws. It is said to be air tight and proof against humidity and rodents.

A boiler that cleans itself is a new idea. For this purpose a jet puts sediment into a sump and causes water to continually flush the boiler. It is made by Anchor Division, Straton & Terstegge Co., Inc., New Albany, Ind., for use with oil or gas.

To obtain service hot water from a warm air furnace, there is a unit made by Aqua-Air Corp., Elmont, N. Y. Warm air is blown over a copper hot water coil.

A-P Controls Corp., Milwaukee, Wisc., has developed an automatic temperature regulation device which can be applied to the simple small oil space heater.

• INTERESTING AIR CONDITIONING APPLICATIONS

An instrument repair shop at the Ladd Air Force Base in Fairbanks, Alaska, is air conditioned in June because of 22 hours of daily sunlight. A heat pump warms and cools a barge in the Gulf of Mexico and in Los Angeles the air conditioning system of the Statler Hotel is controlled by the sun's energy.

More automobiles and ambulances are becoming air conditioned. It has been found that the heat load increases with car speed due to increase in air velocity and air infiltration. On the other hand, if one slows down to speeds less than 25 mph, the refrigerating capacity falls off.

Air conditioning of the drug store is not unusual but it is always interesting to see how effectively it can be done economically under varying space and other conditions. When the entire store is air conditioned, candy can be displayed and drug odors reduced.

• A MATTER OF TEMPERATURES

An old time weather forecaster says that our climate has been slowly changing, although he says it will not change much for the next 100 years. His forecast is that at some time during this coming period the temperature will be 130F in California's Death Valley, —64F in northern Montana, —16F and 107F in New York City, —28F and 107F in Portland, Me., 115F or higher in the midwest, 23F in Los Angeles, and 14F on the Florida coast.

Westinghouse Research Laboratories have produced a vacuum bottle which maintains liquid helium at a temperature of —452F for a bit over three months. The helium is immersed in liquid nitrogen at —300F to keep down heat transfer.

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NEW improved design MULTI-DUTY FILTER now available in 3′, 4′ and [redacted]

3′+3′+3′=9′ and 4′+5′=9′. What's the difference? Plenty—costwise—it means you can install a 9-ft. wide filter with *two sections* instead of *three*. That's why the new Multi-Duty, with addition of the 5-ft. section, permits you to select the most economical combination of filter widths to fit a limited space.

And that's just a starter! New chain and sprocket design reduces over-all depth of the Multi-Duty by 5½ inches. Improved panel design features through rod suspension. More positive air seals eliminate possibility of oil seepage.

Greater versatility, lower installation costs, important space savings—you get them all with the new Multi-Duty. And what else? The proved performance and dependability of America's "most specified" automatic, self-cleaning air filter! Call your local AAF representative for complete product data, now, or write for Bulletin No. 241.

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

NEWS OF THE MONTH

ASHVE MEETING

to be held in Houston, which claims to be America's most air conditioned city. Fleisher to be honored.

The 60th Annual Meeting of The American Society of Heating and Ventilating Engineers will be held in Houston, Texas, which claims to be America's most air conditioned city, January 25-27, 1954. Plans for the meeting, at which a total of 13 technical papers will be presented at four sessions, are now complete according to D. M. Mills, general chairman of the Committee on Arrangements for the South Texas Chapter.

Topics to be covered in the sessions include cooling towers, automobile air conditioning, panel heating and controls, the heat pump, the availability and utilization of solar energy for heating, air jets, room air distribution, a new type radio-meter, residence cooling and building heating.

The first session will be held at the Rice Hotel, meeting headquarters, on Monday morning, with ASHVE President Reg. F. Taylor, Houston, presiding and L. T. Mart, Kansas City, Mo., as chairman.

• **PROGRAM.**—The technical program for the meeting is as follows:

Monday, January 25

Prediction of Cooling Tower Performance, by W. W. Smith, College Station, Texas.

Automobile Air Conditioning—Progress and Problems, by P. J. Kent, Detroit, Mich.

Pressure Loss of Air Flowing Through 45-Degree Wooden Louvers, by Phil R. Cobb, College Station, Texas.

Tuesday, January 26

Circuit Analysis Applied to Load Estimating, by H. B. Nottage, Inglewood, Calif., and G. V. Parmelee, Cleveland, Ohio.

Heat Flow Characteristics of Hot Water Floor Panels, by E. L. Sartain, Urbana, Ill., and W. S. Harris, Urbana, Ill.

Effects of Non-Uniformity and Furnishings on Panel Heating Performance, by L. F. Schutrum, Cleveland, Ohio, and C. M. Humphreys, Cleveland, Ohio.

Field Studies of Floor Panel Control Systems, Part II, by A. B. Algren, Minneapolis, Minn., E. F. Snyder, Jr., Minneapolis, Minn., R. R. Head, Minneapolis, Minn.

Wednesday, January 27

Costs of Operating the Heat Pump in the Equitable Building, by J. D. Kroeker, Portland, Ore., and R. C. Chewning, Portland, Ore.

Availability and Utilization of Solar Energy, by R. C. Jordan, Minneapolis, Minn., and J. L. Threlkeld, Minneapolis, Minn.

Effects of Air Conditioning on Plant Growth, by F. W. Went, Pasadena, Calif.

Room Air Distribution Research for Year 'Round Air Conditioning—Part II, Supply Outlets at Three Floor Locations, by H. E. Straub, Urbana. Ill., and S. F. Gilman, Urbana, Ill.

Cooling a Small Residence Using a Perimeter-Loop Duct System, by D. R. Bahnfleth, Urbana, Ill., C. F. Chen, Urbana, Ill., and H. T. Gilkey, Urbana, Ill.

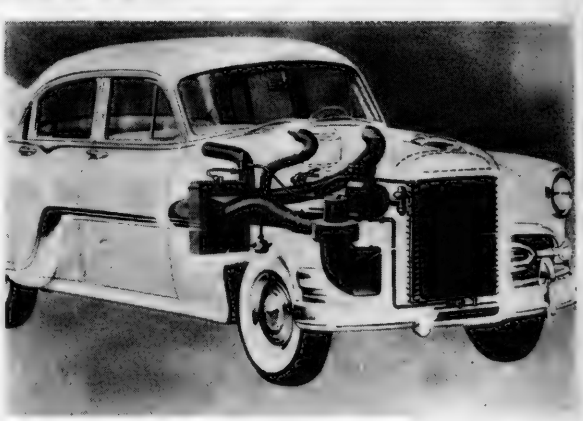
A Two-Sphere Radiometer, by D. J. Sutton, Minneapolis, Minn. and P. E. McNall, Jr., Minneapolis, Minn.

• **AWARD.**—Walter L. Fleisher, New York, N. Y., has been nominated to receive the F. Paul Anderson Medal of the Society for 1953 in recognition of outstanding contributions to the advancement of heating, ventilating and air conditioning in the field of human comfort.

AUTOMOBILE AIR CONDITIONING

increases in popularity despite high price and labor's jurisdictional disputes.

Automatic cooling of automobile interiors in summer continues to grow in popularity, and sales of cars with factory-installed systems are increasing in spite of the price tag marked on the order of $500. Disputes as to who is to install and service the systems are being ironed out by the unions representing refrigeration and automotive workers.



The unique air conditioning system offered as a factory-installed accessory on 1954 Pontiacs with eight-cylinder engines is entirely front-mounted, as shown. The compressor is mounted on the top right-hand corner of the cylinder block and the condenser located ahead of the radiator behind the grille. The evaporator is placed under the top surface of the right fender back of the front wheel opening. Outside air enters through a duct at the right side of the engine which is divided near its center so that, by movement of the controls mounted on the instrument panel, it is possible to mix incoming uncooled air with that cooled by the evaporator for a wide range of temperature control. Cooled air, which is always clean since it is not recirculated, enters the car through outlets at each end of the instrument panel equipped with two adjustable nozzles.

• **PONTIAC.**—New models of the 1954 Pontiac 8 can have a factory-installed system which is unlike other

(*Continued on page* 120)

WHEN YOU SEE THE GOOD WILL you gain—when you make Dorex Air Recovery part of your air conditioning and ventilating installations—you'll be thankful indeed. Every $100 your clients invest in Dorex Air Recovery should save them about $400 on original equipment; and every $1 spent for Dorex maintenance over the years should lop about $4 off operating costs. The reason is simple—

Dorex Air Recovery "manufactures" *fresh* air by taking the odors and gaseous impurities out of *used* air. So there is far less outside air to heat or cool. But savings aside, Dorex Air Recovery is well worth while merely for its ability to maintain air freshness and abate odor nuisances common to many manufacturing processes.

Twenty years of experience and more than 10,000 installations back up the claims made for Dorex Air Recovery. You'll find the full story in our fact-packed bulletin: "How to Manufacture Fresh Air." Mail the coupon today for your copy. Connor Engineering Corporation, Danbury, Conn.

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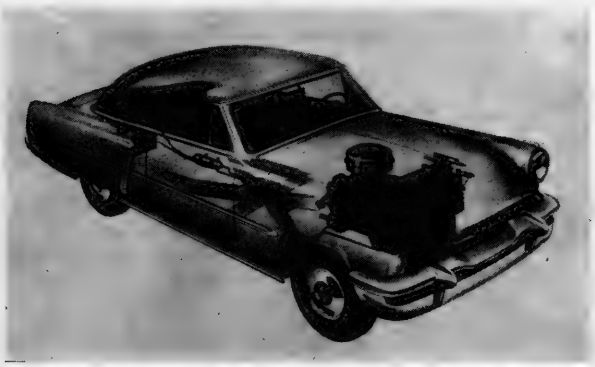
City.....Zone.....State.....

AUTOMOBILE AIR CONDITIONING

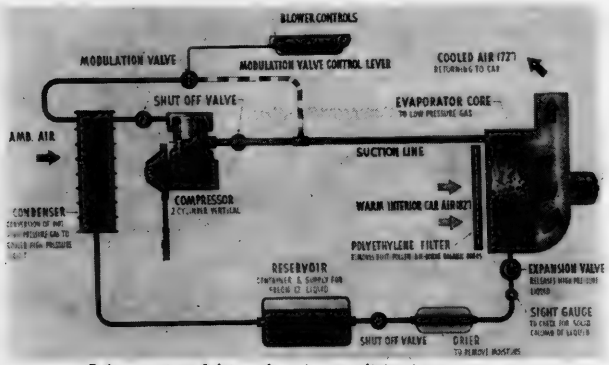
(*Continued from page* 118)

makes in that it is entirely front mounted. Most other systems use trunk space for some of the components.

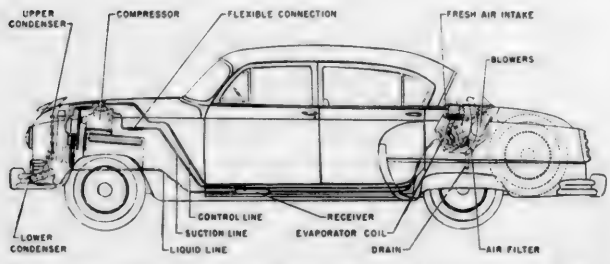
• **LINCOLN.**—Lincoln-Mercury dealers offer essentially the same system as was available in 1953 Cosmopolitan and Capri models. It features a modulating control system and a polyethylene filter for removal of dust, pollen, and organic odors.



The Lincoln unit uses the principle of recirculation. Air taken from the floor at the rear seat passes through a polyethylene filter and then into an evaporator located in the trunk compartment where it is cooled and returned to the passenger compartment by two axial flow blowers mounted behind the rear seat. These blowers can be controlled from the instrument panel controls. A two-cylinder vertical compressor is operated by a separate belt from the crankshaft. Condenser is installed in front of the radiator. A heavy-duty radiator and a five-bladed fan are the only major changes in the car required to accommodate the air conditioning system.



Schematic of Lincoln air conditioning system.



This artist's rendition outlines the Chrysler Airtemp automobile air conditioning unit mounted in a four-door sedan. Principal assemblies in the system are (1) two heat-dissipating condensers mounted in the front of the car; (2) four cylinder, V-type belt-driven compressor mounted on the right of the engine under the hood; (3) Freon receiving tank; (4) evaporator located in the trunk under the rear shelf. The evaporator assembly also contains the blower which circulates cool air into the passenger compartment from an outlet in the deck behind the rear seat.

One of the feature attractions of the recent All-Industry Exposition, Cleveland, Ohio, was this unique automobile air conditioning display seen in the Frigidaire booth. The air conditioning system is completely exposed, enabling the observer to see all parts of the unit. The cutaway arrangement of the mock-up is the size and design of a Cadillac car with an authentic engine, seats, steering wheel and the operating Frigidaire air conditioner.

• **CHRYSLER.**—The 1954 system for the Chrysler line is an Airtemp unit with trunk-mounted evaporator and blower such that both supply and return air pass through grilles in the rear shelf.

INDUSTRIAL HYGIENE FOUNDATION

calls 18th Annual Meeting at Mellon Institute, Pittsburgh, to review problems in industrial health.

Over 1,000 representatives from member companies and invited guests attended the 18th Annual Meeting of the Industrial Hygiene Foundation at Mellon Institute, Pittsburgh, Pa., November 18 and 19. The program of meetings included a full day of concurrent sessions on the various fields of professional interest bearing on control of the industrial environment and the health of workers. Papers were presented by authorities in the medical, legal, chemical-toxicological, and engineering fields. The second day was devoted to a series of general talks setting forth the aims of the foundation and the role of various factors at the policy level, such as employer-employee relationships, national problems in industrial noise, and alcoholism, and the viewpoint of both labor and management in regard to problems of human relations in industry.

• **ENGINEERING.**— At the engineering conference November 18 under the chairmanship of W. C. L. Hemeon, engineering director of the Industrial Hygiene Foundation, several papers of interest to ventilating engineers were presented. Dr. Philip Drinker of the Harvard School of Public Health, reported on the London Smog

(*Continued on page* 124)

1 *of the many reasons why you will find it pays to sell Chrysler Airtemp*

Your prospects **know** and **respect** the CHRYSLER AIRTEMP **name!**

● The great majority of buyers of "Packaged" Air Conditioning are "first time" buyers. To make up for their lack of knowledge based on personal experience, they prefer the product with a brand name they know—and know they can trust. Because most people know and respect the Chrysler Airtemp name, associate it with engineering leadership, have confidence in the quality of the products which carry it . . . you will find "Packaged" Air Conditioning by Chrysler Airtemp *easier to sell.* With Chrysler Airtemp you don't have to sell the name as well as the product . . . the name *helps you sell* the product!

But name recognition and prestige is only one of so many important reasons why it will pay you to sell Chrysler Airtemp. Check seven more of these reasons in listing at left. Then fill out and mail convenient coupon which appears below for complete facts of the most profitable proposition in "Packaged" Air Conditioning today. *Do it now!*

7 *more advantages you sell with when you sell Chrysler Airtemp . . .*

● **More Units in Use**—Chrysler Airtemp pioneered "Packaged" Air Conditioning in 1937, has more units in use today than any other manufacturer.

● **Advanced Engineering** by Chrysler Airtemp offers your customers features that mean more because they do more for them.

● **Lower Installation Cost**—super-quiet operation permits use within or very close to areas to be cooled, reducing amount of ductwork required. All units shipped completely factory-assembled and tested.

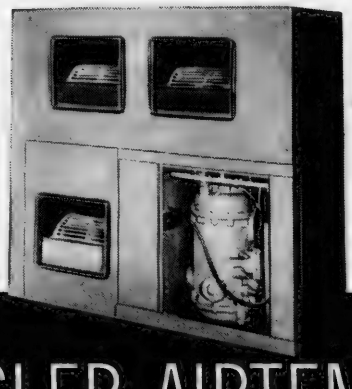
● **Assured Dependability**—all units manufactured to exacting standards of precision in a windowless, completely air conditioned factory. Each unit is thoroughly inspected and tested using special equipment and methods, to assure dependable performance in the field.

● **More Complete Line**—9 models meet all requirements.

● **More National Advertising** to all prospects and specific benefit advertising to individual businesses—the best markets for "Packaged" Air Conditioning.

● **More Local Selling Helps**—the broadest line of tested and proved local selling helps for dealers.

"Packaged" Air Conditioners in six water-cooled models, from 2 to 15 H.P.



New "Packaged" Air-Cooled Air Conditioners— *no water needed, no plumbing required.* 2, 3 and 5 H.P.

Guaranteed by Good Housekeeping

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heating • air conditioning for homes, business, industry

Airtemp Division, Chrysler Corporation, Dayton 1, Ohio

H&V-1-54

Airtemp Division of Chrysler Corporation
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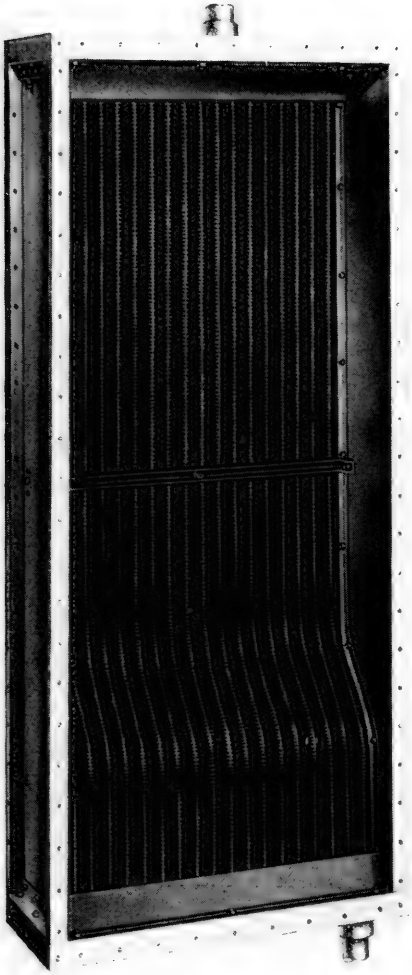

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PRODUCT INFORMATION SERVICE

Use the postage-free postcard below for further information on:

- **News of Equipment and Materials**

or a copy of the following

- **New Catalogs**

Circle the item Numbers in which you are interested and print clearly your name and address with title.

NEW CATALOGS

SEPARATORS—A separator catalog, Bulletin 201, describes the line type Hi-eF purifiers made by The V. D. Anderson Co., Cleveland, Ohio. It discusses the removal of entrained moisture and scale in steam to turbines, reciprocating engines, and regulating valves; oil, dirt, and condensate from exhaust steam; condensate from compressed air lines; dirt particles and line scale from steam in food processing operations, and entrainment and carryover from vapor lines following evaporation. Selection of purifiers has been greatly simplified by charts which enables the user to quickly select the size purifier that will give the best efficiency at various flows and pressures. ----------**Item 101**

ALL TYPES OF HOISTS—A condensed full-line catalog is available from Coffing Hoist Co., Danville, Ill. It contains illustrations, descriptions and specifications for over 100 different types and sizes of portable hoists, including ratchet lever hoists, a line of standard and specialized spur gear hoists, Quik-Lift electric hoists, all-purpose Hoist-Allis, and Mighty Midget pullers which are designed to hang on a tool belt. ----------**Item 102**

WATER TUBE BOILER—Its Type C boiler is the subject of a revised catalog, No. SB-49, issued by Erie City Iron Works, Erie, Pa. This water tube boiler features large water holding capacity, fast steaming, large steam relieving surface, and the production of superheated steam from a standardized design. A unique method of steam take-off through a bank of tubes into a header eliminates moisture carryover. ----------**Item 103**

SOLENOID VALVE—A new 8-page technical bulletin, No. W-7, fully describing its solenoid operated valve, is issued by Golden-Anderson Valve Specialty Co., Pittsburgh, Pa. These valves, used in steel mills, rubber plants, water works, processing mills, chemical plants, pulp and paper mills and many other industrial concerns, automatically open or close in response to time clock, pressure switch, manual switch or other impulse. Bulletin contains operating instructions along with detailed parts lists and dimensions. ------**Item 104**

NEW HEATING CONTROLS—A 1954 condensed catalog on automatic heating controls is issued by Penn Controls, Inc., Goshen, Ind. Of 28-pages, it contains information on specifications, applications, engineering data, and the procedure for ordering any of the company's controls for oil, gas or coal heating systems. Added to the Penn line is a newly-designed horizontal low voltage heating thermostat, supplementing the present vertical thermostat. In addition, single pole or two-pole heavy duty steam pressure controls are now offered. Listed for the first time is a short shank warm air furnace control for mounting directly on the casing. ----------**Item 105**

AIR VENT WALL CHART—A wall poster type Check Chart, illustrating and describing its automatic air vents for hot water heating systems and showing application of the air valves, with repair parts for each valve, is available from Maid-O'-Mist, Inc., Chicago, Ill. ----------**Item 106**

STEAM BOILER COMBUSTION — A pamphlet explaining the principles of its patented method of cyclonic combustion is published by Cyclotherm Div., United States Radiator Corp., Oswego, N. Y. Descriptive drawings show how air is introduced into the combustion chamber at high speeds in a revolving spiral vortex, transferring heat to the fire tube through radiation and convection. --------**Item 107**

BRASS AND COPPER FITTINGS—Simplification in the listing of types and sizes is the aim of Catalog 300 of Anderson Metals Corp., Overland Park, Kan. The arrangement enables even a layman to identify the specifications of any part with ease. The catalog covers a wide line of tube fittings, valves, cocks, tubing tools and specialty accessories. ----------**Item 108**

EXPANSION JOINT DESIGN GUIDE—A 24-page Flexon expansion joint design guide is issued by Flexonics Corp., Maywood, Ill. The catalog contains engineering application and selection data necessary to the proper solution of pipeline expansion problems. It also includes a discussion of the various types of expansion joints on the market, the many types of the company's expansion joints available, and types of pipeline motion solved by expansion joints. Also covered are expansion joint design considerations, installation instructions, and selection data. The center spread of the catalog is devoted to a schematic piping layout illustrating various expansion joint applications and principles. ----------**Item 109**

OIL-FIRED SPACE HEATER — Bulletin 550 of Dravo Corp., Pittsburgh, Pa., describes its Parafio oil-fired, warm-air space heater, which is available in two capacities, 200,000 and 250,000 Btu per hour. The folder describes the features and lists the many types of commercial and industrial structures suitable for Parafio application. ----------**Item 110**

L.P. GAS VALVES—A colorful circular V-110, illustrating and describing the complete selection of its new LP gas valves is issued by The Fairbanks Co., New York, N. Y. Construction details, basic specifications, and valve applications are furnished for the bronze globe, angle, check, spring-loaded check and gate valves. The valves are recommended for all common commercial forms of L.P. gases whether handled in liquid or gaseous state and are designed for application on all types of piping systems for storing, transporting, and utilizing these gases. --**Item 111**

LIQUID LEVEL CONTROLS—A six page illustrated bulletin describing fully its new line of liquid level controls is available from Ferrara Inc., Oak Park, Mich. The controls are in two basic types, electro-magnetic and electronic. The electro-magnetic unit features a unique circuit employing a DC operated relay for hum and chatter free operation with AC in the probe circuit. The electronic unit, with less than two microamps current in the probe circuit, employs a cold cathode amplifier for use with liquids having resistivities up to 200 megohms. --**Item 112**

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BOILER MANUAL—A new and modernized 32-page general catalog No. 80, is published especially as a reference guide for engineers and heating contractors by Kewanee-Ross Corp., Kewanee, Ill. It contains the latest and most complete data on the entire line of the company's high and low pressure steel boilers for commercial, industrial and residential use. Also included in the new catalog are full descriptions and illustrations of water heating products, both direct fired and storage types as well as indirect water heating coils. Pages on boiler support brackets, structural steel suspension and induced draft fans for boilers complete this technical manual. ----------**Item 113**

MARINE PLUMBING AND HEATING—A marine plumbing and heating catalog has been issued by Crane Co., Chicago, Ill., to help contractors and specifiers to select equipment for new construction or re-fitting. The 46-page catalog illustrates modern fixtures for use in the marine field, including all types of naval craft and commercial vessels, as well as larger private yachts. ----------**Item 114**

PRESSURE REGULATORS—Steam catalog 539, 8 pages, devoted to its pressure regulators for steam, air and water, is issued by Watts Regulator Co., Lawrence, Mass. Intended for steam heating and process applications, these regulators are made in models 127, 125, and 152. Catalog includes comprehensive description and application information. --------**Item 115**

GAS UNIT HEATERS — A twelve-page technical bulletin No. 23.3, describing its line of Series 23A gas-fired unit heaters, is issued by United States Air Conditioning Corp., Minneapolis, Minn. The line includes propeller fan and blower type heaters, each produced in fourteen models, ranging in capacity from 55,000 to 500,000 Btu per hour and burning all types of gas at the rated capacities. ----------**Item 116**

SCHOOL HEATING HANDBOOK—Classroom heating conditions that cause pupil discomfort are described and corrections suggested in a handbook No. SA-2109 for school maintenance personnel published by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. The booklet, General Maintenance of Pneumatic Control Systems, is designed to help acquaint school custodians with the complex system of heating and heat-regulation used in the modern school and to provide a quick source of reference material when trouble develops in the heating or heat control system. It sets up recommended weekly, monthly, semi-annual and annual maintenance schedules. In the trouble shooting guide, actual classroom complaint conditions such as overheating, underheating, hot and cold blasts and room stuffiness are described; possible causes and corrective steps are listed. ----------**Item 117**

PIPE DATA CARD—A data card, TDC 138A, designed for those involved in selection, application and installation of carbon, alloy and stainless steel pipe, is issued by the Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. It contains information on dimensions, weights, specifications, grades and analyses of seamless and welded carbon, alloy and stainless steel pipe. It presents pertinent data on six pipe size schedules and complete data on steels covered by ASTM and ASME specifications. --------**Item 118**

AIR CONDITIONING—An air conditioning and refrigeration catalog No. 98, a consolidation of several previous bulletins, has been issued by McQuay, Inc., Minneapolis, Minn. Consisting of 24 pages, the catalog is an exceedingly comprehensive one. The catalog illustrates and gives dimensions and capacities of the company's unit coolers, cooling towers, evaporative condensers, air conditioners, and coils, with a great amount of selection and application data. ----------**Item 119**

ADJUSTABLE-PITCH FANS—Adjustable-pitch fans for cooling tower, heat exchanger, and mine use are described in Bulletin A-111, a publication of Hartzell Propeller Fan Co., Piqua, Ohio. The line of adjustable-pitch fans includes 10 to 22 ft. diameter models with plastic blades and welded steel hubs and 40 to 103 inch dimeter models with cast-aluminum alloy blades and hubs. The bulletin includes descriptions and specifications on these fans. ----------**Item 120**

PIPE INSULATION—A four-page folder on Foamglas pipe insulation is available from Pittsburgh Corning Corp., Pittsburgh, Pa. It features on-the-job installation photographs pointing out the advantages of cellular glass insulation for pipe temperatures between 300 and 800 deg. F. A listing of the physical properties of the material and condensed recommended specifications make the folder an excellent reference for engineers, applicators, and insulation contractors. -----**Item 121**

AIR CONDITIONING AND LUMINOUS CEILINGS—A brochure, Design Data and Laboratory Tests on the Use of the Plenum above Acusti-Luminus Ceilings, is published by Luminous Ceilings, Inc., Chicago, Ill. While luminous ceilings have customarily been hung below existing air conditioning ducts, by virtue of its highly adaptable design, it has proved practical in areas not already equipped with ducts to allow the soffit above the diffuser to act as an air conditioning plenum. While the economy of such an arrangement is obvious, technical information was lacking to permit the air conditioning engineer to make his calculations. The booklet was designed to answer these questions and many more which may arise concerning the use of the plenum for heating or ventilating. The brochure describes in some detail, supplemented by graphs and illustrations, such elements as pressure loss, flow pattern, heat transfer, plenum supply, feeder duct arrangements, sidewall grille feeders, multi-vent valve feeders, and plenum exhaust. ----------**Item 122**

PROCESS TEMPERATURE CONTROL—Educational Bulletin F6149 on Temperature Control Systems is available from Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill. Instrument industry control terminology is given in this bulletin, as well as rules to follow in selecting the proper method of temperature control for process characteristics or reaction. A complete explanation is contained of the various types of control systems, ranging from two-position on-off to proportional position with automatic reset. ----------**Item 123**

UNIT HEATERS—A bulletin on its utility unit heaters is issued by L. J. Wing Mfg. Co., Linden, N. J. These are lightweight, horizontal discharge heaters for general purpose heating, embodying the company's Featherfin heating element with finned tubes of seamless drawn copper. The fan, in many sizes of this heater, features a new type of motor mounting, incorporating an integral safety guard. Engineering data, with wiring and piping details are included. ----------**Item 124**

INDUSTRIAL WATER SOFTENER—An industrial water softener brochure is published by Illinois Water Treatment Co., Rockford, Ill. It contains all necessary information for the accurate specification of water softener equipment for any type of manufacturing or processing plant, hospital, school, college, hotel, club or other institution where hardness-free water is required or desired. ----------**Item 125**

ELECTRIC HEAT EQUIPMENT—Electric Heating Elements and Equipment is the title of a comprehensive catalog of Industrial Engineering & Equipment Co., St. Louis, Mo., giving complete information on the company's strip and flat type heaters, cartridge heaters, immersion heaters, preheaters, hot plates, air heaters, oven heaters, thermostats and control equipment, blast coil and booster heaters, and engineering data. ----------**Item 126**

GAS-FIRED SPACE HEATER—Case Study 560-62, recently issued by Dravo Corp., Pittsburgh, Pa., describes how gas-fired warm air space heaters were positioned on the floor and suspended overhead to provide uniform comfort heating for an automotive spare parts depot. --**Item 127**

1954 CALENDAR—An attractive calendar for 1954 is available from Warren Webster & Co., Camden, N. J. Pictures on each month's page include outstanding installations of Webster heating equipment in industrial, institutional and residential applications. ----------**Item 128**

PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52								
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128		

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COMPACT COOLING TOWERS OF GROWING IMPORTANCE IN RESIDENTIAL COOLING

Market surveys reveal that the sale of room air conditioners for homes has increased by 600% since 1947. In 1952, total sales of both cabinet and window types for homes was 251,000 units. Substantial gains were registered in 1952

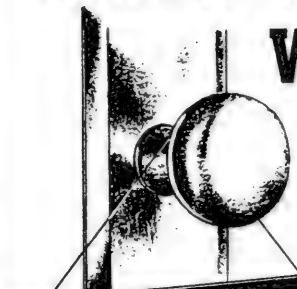
and the 1953 figures are expected to surpass 500,000 units. It is expected that the trend will swing to built-in central cooling system. Residential air conditioning, which originally "caught on" in volume in the Southwest is rapidly moving North and East in popularity...and promises to be an even bigger market in 1954.

To meet the need for adequate cooling towers for "built-in" residential air conditioning installations, the Binks Manufacturing Co. has introduced an *extra quiet* unit which can be located in the basement, garage or yard. This compact cooling tower is Model B-23-B. It is designed specifically for home use, is furnished complete with a small cir-

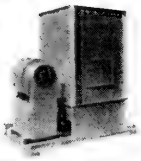
culating pump. It is blower driven by a single motor. This is suitable for loads from two to three tons commonly offered to the consumer market.

Full information on this specially-designed, moderately-priced unit may be obtained by writing direct to the manufacturer, Binks Manufacturing Company, 3120-38 Carroll Ave., Chicago, Ill. Ask for Bulletin 47-C. The new unit is now in production.

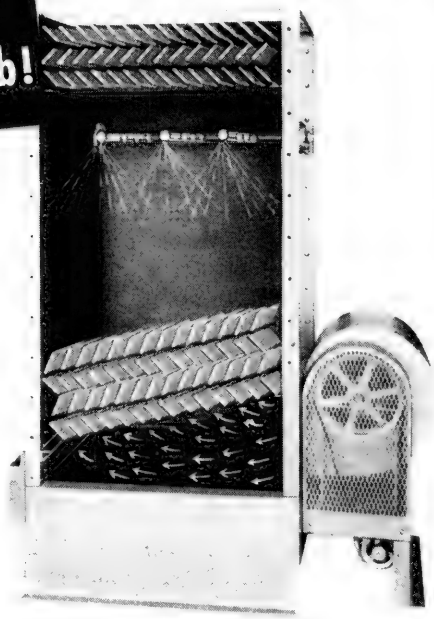
Achieve maximum cooling WITHOUT NOISE!



Binks
SERIES 3-B
Cooling Tower



QUIET
Does Not Disturb!



- Only dry air passes through the air propulsion assembly. This reduces corrosion and maintenance.
- Non-clogging ROTOJET nozzles produce maximum cooling. The whirl chamber causes fine fluid break-up.
- Air current moves up in opposite direction to downward water flow, thereby accelerating the cooling rate and volume.

For use indoors or out, a Binks *blower-type* cooling tower provides the cooling efficiency you want—*plus* easy, *low-cost maintenance*... and smooth, *silent*, dependable operation. A Binks type 3-B tower is *extra quiet* because its squirrel-cage blowers provide ample air movement while running at slow speeds.

Binks spray-deck construction steps up cooling efficiency by "filming" the water to expose more surface to the cooling air. This assures maximum heat transfer. *Controlled* air movement through the tower makes it independent of natural breeze.

You pay no more for this extra performance when compared with other equipment of similar size.

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

REPRESENTATIVES IN ALL PRINCIPAL CITIES • SEE YOUR CLASSIFIED DIRECTORY

SEND TODAY for these bulletins:
No. 47-A—Type 2-B (3 to 30 tons);
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Binks
EVERYTHING FOR WATER COOLING

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3120-38 Carroll Ave., Chicago 12, Ill.

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☐ Bulletin 47-A ☐ Bulletin 47-B ☐ Bulletin 47-C

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COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

INDUSTRIAL HYGIENE

(*Continued from page* 120)

of December, 1952. For a period of four days, a dense, yellow, acrid tasting fog about 650 feet deep lay in the London basin permeating houses and leaving tarry deposits over all. Thousands of people died as a direct result of the fog, with the higher death rate particularly noticeable among infants and individuals over 65 subject to asthma or other bronchial conditions. Spot analyses showed marked increases in concentration of SO_2 from a normal .2 to a peak of 1.34 ppm, while smoke solids rose from an average of .5 mg to 4.46 mg per cubic meter. Professor Drinker pointed out that while the mac value of SO_2 in this country is 10 ppm, the probability exists that the sharp increase in concentration accompanied by moisture, smoke solids, and other contaminants was responsible for the increased death rate. While the London disaster was in many ways comparable to and more spectacular than the Donora episode of 1948, Professor Drinker pointed out a possibly significant difference in the population of metallurgical industrial establishments. There is no metallurgical industry today in London comparable to the heavy concentrations of such industries in Donora. Coal smoke was the chief offender in London. Temperatures during the fog were low, near freezing.

Mechanical arrangements for controlling dust and fume were described by J. K. Meyer, assistant general manager of Corhart Refractories Company. Mr. Meyer described several such arrangements including the hooding of an electric furnace by 1-inch steel plate (and the incidental conversion of workers from opposition to the project to enthusiastic endorsement). Another dust control project involved the blast cleaning of castings supplanting a brush cleaning operation which had created a serious dust problem. It was found that control methods involving direct moistening of the hot castings, resulted in frequent cracking. Blasting with jets of air also created clouds of dust which were not readily controllable by hooding. The ultimate solution was an arrangement for blasting with moist air. With an excess of moisture in the air blast, sufficient moisture condensed on to the dust particles to hold dust to a minimum. A third arrangement described by Mr. Meyer was a seemingly simple decision to tilt, rather than completely overturn, tote boxes from which castings and sand were to be removed.

• **BUILT-IN CONTROL.**—T. F. Hatch, in a paper entitled Principles of New Plant Design for Health Protection, pointed to the difficulties often encountered by industrial hygienists and ventilation engineers when measures for the control of atmospheric conditions hazardous to the health of workers must be devised and applied to existing equipment and operations. With the nature of the process already fixed, it has not always been possible to apply control measures in the most effective form. While the value of successfully correcting existing hazardous conditions has been demonstrated through many years, Mr. Hatch said, it is time now to turn our attention more to the initial design and construction of process equipment so that no unhealthful working conditions will develop.

The application of this aproach in the design stages of a new plant for the Mutual Chemical Company of America in Baltimore was described. The new plant processes chrome ore, converting it to sodium chromate and bichromate for direct use of subsequent conversion to other chromium compounds. The objective was to design both the plant and the equipment in such a way as to minimize the opportunity for materials of known toxic properties to escape into the working atmosphere.

Steps in the process involve the mixing of ore with soda ash and lime, roasting of the mixture, leaching of the solid roast by water solutions, and the further processing of both liquid and solid materials to the point of packing for shipment.

Exposure of concern in the process are to dusts of different composition in dry operations and to mists or dried residues from droplets in wet operations. Problems are typical of those encountered in many industries where solid materials are ground, screened, dried, weighed, washed, or mixed.

Design of process equipment are based on certain fundamental premises:

(1) A fine dust particle is dispersed from its source only by air movement. Therefore, the dust producing potential of a given piece of equipment is proportional to the amount, velocity, and direction of air movement away from the dust source.

(2) The principal force causing air flow in solid materials handling and processing is the movement of the material itself.

(3) Any measures taken to minimize air flow into or away from a process will lower the dust producing potential and reduce the job to be done by accessory control measures such as exhaust ventilation.

Obviously, said Mr. Hatch, an essential step is to enclose dust-producing equipment as tightly as possible and to take the necessary steps to minimize opportunities for air to get into the enclosure and to prevent local air pressure from building up at any point within it. The last is accomplished by providing for the free movement of air from any part of the enclosed system to another. Given such an enclosure, the function of exhaust ventilation is simply to keep the system under a slight negative pressure and thus insure inward rather than outward leakage of air. There are no exhaust hoods in the usual sense and no need to calculate hood capacities in advance. Since pneumatic transport of collected dust is not involved, problems in balancing air flow through a system of exhaust ducts are eliminated. Tightness of the enclosure system and material seals at points where process materials enter and leave the unit were major considerations.

At points in the system where material falls, local pressure may build up because of induced air flow. To prevent this, so-called jumpers are installed at such points. A jumper is a pressure feedback arrangement from the point of impact to the region of air induction.

With primary emphasis placed upon tight enclosures and relatively easy maintenance, exhaust ventilation has

(*Continued on page* 126)

NATIONAL CASH REGISTER SAVES $70,000 A YEAR WITH MODERN COAL EQUIPMENT!

One of the two new boilers used to supply base steam loads for NCR's plant. Older pulverized coal boilers handle swings.

NCR recently installed two modern, stoker-fired boilers in their Dayton, Ohio plant. They supply the major part of the steam used in generating power for 28 factory buildings and heat for nearly 72 acres of floor space. The savings made have convinced NCR that for high efficiency and low costs, you can't beat an up-to-date bituminous coal-fired installation.

Big Loads! Loads run up to 300,000 lbs. per hour. Annual coal consumption is about 60,000 tons.

No smoking allowed! Located near a residential area with strict control regulations, National uses dust collectors and smoke recorders to make coal clean and convenient.

Additional case histories, showing how other types of plants have modernized and saved money with coal, are available upon request.

Before you build a new plant or remodel your present one, let a consulting engineer show you how a modern bituminous coal installation—tailored to your needs—can save you money.

With modern coal-burning equipment, you can save from 10% to 40% on steam costs. Automatic coal- and ash-handling systems can cut your labor costs to a minimum.

You're set for the future, too, with coal. Coal reserves are virtually inexhaustible. America's highly mechanized coal industry is the world's most efficient. Thus you are assured of a dependable supply of coal, at relatively stable prices, for years to come.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association
Southern Building, Washington 5, D. C.

If you operate a steam plant, you can't afford to ignore these facts!

BITUMINOUS COAL in most places is today's lowest-cost fuel, and coal reserves in America are adequate for *hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

FOR HIGH EFFICIENCY ★ FOR LOW COST

YOU CAN COUNT ON COAL!

INDUSTRIAL HYGIENE

(*Continued from page* 124)

a secondary role to play in the dust control program. As a basis for calculating ventilation requirements, an inward velocity of at least 200 fpm was selected. Since there were no large openings for entrance of air into the system, there was no net flow of air to be removed at any point in the system. The control velocity, therefore, was calculated on the basis of total length of all openable joints in the system, such as around access doors, conveyor covers and the like, placing the average crack width at 1/32 inch. In addition, 5 sq ft was assumed as a practical open area for temporary access to the interior. For this particular equipment, the total potential area was calculated at 8 sq ft. A dust collector and exhaust fan with a capacity of 2,000 cfm was installed to provide an inward air velocity of 250 fpm through this estimated area. Similar exhaust arrangements calculated on the same basis were provided for other units handling solid materials. With a total capacity of about 25,000 cfm, exhaust ventilation is provided for systems handling and processing about 900 tons of fine material per day.

• **WET PROCESS.**—When water is added to the hot ore roast, steam is evolved at a fairly high rate, and soluble sodium chromate may be given off in the form of liquid droplets. Hence, leaching facilities were provided with a fairly close fitting hood with approximately 1-inch space between tank and hood, and with free discharge through a large diameter stack to the outside atmosphere. Heat in the roast provides natural draft ventilation. Close control of quantities of ore and water at the point of application maintains the effluent at a satisfactory degree of contamination. In drying and concentrating operations, the number of tanks and evaporators is held at a minimum in recognition of the fact that the probability of mist formation or spillage of liquor increases with the number of such pieces of equipment. Here, also, maximum use is made of closed and tight equipment.

As a consequence of the initial experience in analysis of the health protection requirements, and the deliberate incorporation of controls into the design of the process equipment and of the buildings, control of health hazards has been put on a par with production in the day-to-day operations.

• **DUST CONTROL.**—Two other papers on dust and fume control and a conference discussion of various specific problems pertaining to dusty operations completed the engineering conference. A granular impingement filter for dust and furnace fume collection and cleaning of wet corrosive gases was described by M. I. Dorfan, president and general manager of Mechanical Industries, Inc. The filter is an arrangement whereby contaminated air is passed through curtains of granular material descending at a controlled rate between perforated retainers across the air stream. Any granular material can be selected for use in any size required by screening objectives of the process. H. Rozovsky, Canadian Johns-Manville Company, Ltd., described a dust control operation in asbestos screening and jute bag storage processes.

ANTHRACITE INDUSTRY

presents new automatic commercial size units in special showing at New York. Fire control featured.

New designs and improved versions of automatic anthracite equipment for large buildings and semi-industrial use will go into general distribution throughout the hard coal marketing area starting in January 1954. These are being displayed in the first industry showing of automatic hard coal units for schools, public buildings, apartment houses and institutions opening January 10 at the Architects Building, 101 Park Avenue, New York City.

Several of these new types of commercial-size automatic equipment for anthracite have already been introduced successfully during the past year in limited areas. They are now available in both conversion units and complete boiler and automatic firing units in 100 to 400 pounds per hour capacity.

One of the new types of commercial-size anthracite burning equipment will be this Motor Stoker Crossfeed unit manufactured by the Hershey Manufacturing Company of Manheim, Pa. The showing will be the Crossfeed's introduction into New York.

• **FEATURES.**—The burners feature new principles in cross feed firing; new water cooled moving grates and improved versions of conventional air cooled grates, in equipment burning rice anthracite; also a self contained, self cleaning boiler-burner unit, which uses pea anthracite.

Universal bin feed is an integral part of some of the units. Precise automatic control of coal feed, auxiliary

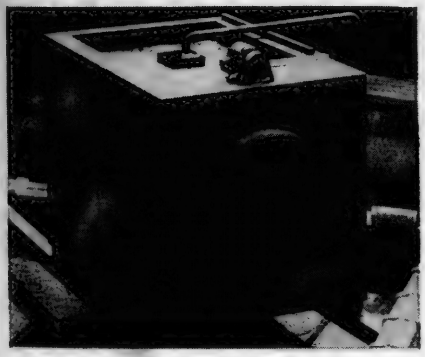
(*Continued on page* 128)

HALSTEAD & MITCHELL COOLING TOWERS

20-Year Guarantee!

On the Wetted Deck Surface of Koppers Pressure-Treated Wood

Here's the industry's greatest cooling tower value . . . "built like a battleship" for 20 years of foolproof performance. Halstead & Mitchell's pioneering in exclusive use of Koppers pressure-treated wood in the wetted deck surface makes possible the unprecedented 20-year guarantee against rotting, and provides the industry's most effective deterrent against fungi growth. Economical, lastworthy . . . the special H & M design for water distribution eliminates, thru the use of an efficient gravity-type distributing pan, extra pumping head required on spray type towers, also cuts down windage losses due to atomizing of water. The complete assembly is with Everdur bolts . . . disassembly is easy even after years of service. Easily accessible for cleaning through inlet on back of towers in all sizes.



MORE EFFICIENT IN ANY INSTALLATION

H&M #CT-4000 Induced-Draft Cooling Tower supplying the condensing water for 20 HP and 10 HP water-cooled condensing units in 3-story jewelry storeroom air conditioning. Note open-type distributing pan. This installation also has remote water basin in basement for year-round operation.

2 TONS to 100 TONS

A cooling tower for all applications, from 5 to 50-ton capacities—made by Halstead & Mitchell, one of the world's largest manufacturers of water-cooled Cleanable Condensers.

AT LEADING WHOLESALERS EVERYWHERE

Write for descriptive bulletin and information on engineering helps.

HOUSING—10 gage (⅛"+) sheet-steel case with 3 coats Bitumastic lining. Electrically welded cabinet. All bolts used are Everdur for ease of disassembly after years of service.

WATER DISTRIBUTION—Gravity type distributing pan eliminates extra pumping head, cuts down windage losses, due to atomizing water.

FAN AND DRIVE—Quiet-operating stainless steel 8-bladed fan, stainless steel shaft, chrome-dipped rust-proofed pulleys. Cast iron bearing supports. Adjustable belt tension.

HM Halstead & Mitchell

OFFICES: BESSEMER BUILDING • PITTSBURGH 22, PA.

ANTHRACITE INDUSTRY

(*Continued from page* 126)

ash removal mechanism, and other new devices make possible automatic operations capable of heating buildings using from 100 to 300 tons of rice anthracite a year in a single boiler.

The units on display include: Motor Stoker Crossfeed, manufactured by the Hershey Machine & Foundry Company of Manheim, Pa.; Anthratube, manufactured by the Axeman-Anderson Company of Williamsport, Pa.; the Fire Jet, manufactured by the Electric Furnace Man, Inc., of Emmaus, Pa.; and the Losch Boiler Burner unit, manufactured by the Losch Boiler Company of Summit Station, Pa.

HESS ELECTED PRESIDENT

of the ASRE at the annual meeting held in Washington, D. C.

More than 900 members and guests attended the forty-ninth annual meeting of the American Society of Refrigerating Engineers held at the Shoreham Hotel, Washington, D. C., December 5 to 9. In all there were four technical sessions, a conference on domestic refrigerator engineering, a symposium on the heat pump, an air conditioning conference, and a water conservation symposium. An afternoon was devoted to inspection trips and meetings of ASRE committees.

• **OFFICERS.**—The new officers are president, Arthur J. Hess, president, Hess, Greiner & Polland, Los Angeles, Calif.; first vice president, Leon Buehler, Jr., chief refrigeration engineer, Creamery Package Mfg. Co., Chicago, Ill.; second vice president, C. M. Ashley, chief development engineer, Carrier Corp., Syracuse, N. Y.; treasurer, Hermann F. Spoehrer, vice president and treasurer, Sporlan Valve Co., St. Louis, Mo.; executive secretary, M. C. Turpin.

The following have been added to the list of association directors: A. L. Hesselschwerdt, Jr., associate professor, Massachusetts Institute of Technology, Cambridge, Mass.; R. H. Lock, vice president, R. H. Lock & Sons, Ltd., Toronto, Ont.; Fred P. Neff, engineer, Tupman Thurlow Co., Chicago; G. K. Iwashita, Air Conditioning Division, General Electric Co., Bloomfield, N. J.

• **AWARDS.**—W. R. Woolrich, Chairman, Awards Committee, presented the Wolverine Award to Ned E. Hopkins and John Seelaus for their paper Temperature Change as Affected by Different Pulldown Methods. The Best Section Paper Award was presented to A. C. Petrasanta for his paper Some Fundamental Principles of Noise Control.

The Chicago Section trophy for the section making the largest percentage increase in membership went to the Carolina section.

ASRE section charters were presented to F. P. Shannon, chairman of the Louisville, Ky., section and to Paul Mader, chairman of the Dayton, Ohio Section.

• **COMING CONVENTIONS.**—The next semi-annual meeting will be held some time in July at Seattle, Wash.; the 1954 annual convention which marks the 50th annual convention and the 25th anniversary of the Philadelphia section will be held at the Hotel Ben Franklin, Philadelphia, Pa. The 1955 summer meeting is to be held in Milwaukee, Wis.

THERMOCOUPLE TABLES

for iron-constantan reference in range from —310F to +1,600F revised to match commercial units.

NEW REFERENCE TABLES for iron-constantan thermocouples, recently prepared by the National Bureau of Standards, constitute an important step toward uniformity in this field. Covering a very broad range—from —310 to +1,600F—the new tables correspond more closely to the properties of commercially available thermocouples than do any of the other iron-constantan reference tables currently in use. The NBS tables are based on an investigation carried out by R. J. Corruccini, Henry Shenker, and other members of the Bureau staff at the request of the Scientific Apparatus Makers of America. They have been recommended by the SAMA for adoption as a tentative standard.

Thermocouple reference tables are widely used in science and industry for determining temperatures from observed thermocouple voltages and in the preparation of purchase specifications for thermocouple wire. They are also used to define the relation between impressed emf and scale reading for pyrometers which indicate temperature directly.

• **NEED.**—For measurement of temperatures up to 1,500F, the iron-constantan thermocouple is widely employed. Yet it is the only type of thermocouple for which uniformity of commercial practice has not yet been established in this country.

Various efforts have been made to achieve greater uniformity. In 1938 NBS derived a new table, known as the RP1080 table which represented the average behavior of the commercially available iron-constantan thermocouples tested at that time. However, this table was not widely adopted, because its use in most cases would have involved changing the scales of the pyrometers then in use. Finally in 1948, the Scientific Apparatus Makers of America, representing several of the pyrometer manufacturers, adopted the temperature-emf relation known as the 1913 L and N table (this table is identified with the tables given in International Critical Tables) as a tentative standard for iron-constantan thermocouples over the range from 32 to 1,400F. This relation was chosen because it was in wider use than any other. However, experience has shown that it has not been possible to produce a thermocouple from present-day commercial iron that will correspond precisely to the 1913 table. Moreover, any thermocouple that closely matches this table in the range below 1,400F has been found to deviate greatly from it in the range above 1,400F. A further difficulty was the fact that the original 1913 table did not extend below 32F. The SAMA therefore requested the National Bureau of Standards to derive a reference table that would be as close as possible to the 1913 table and yet be free from these defects.

(*Continued on page* 130)

Robert Shaw Dormitory

MICHIGAN STATE COLLEGE

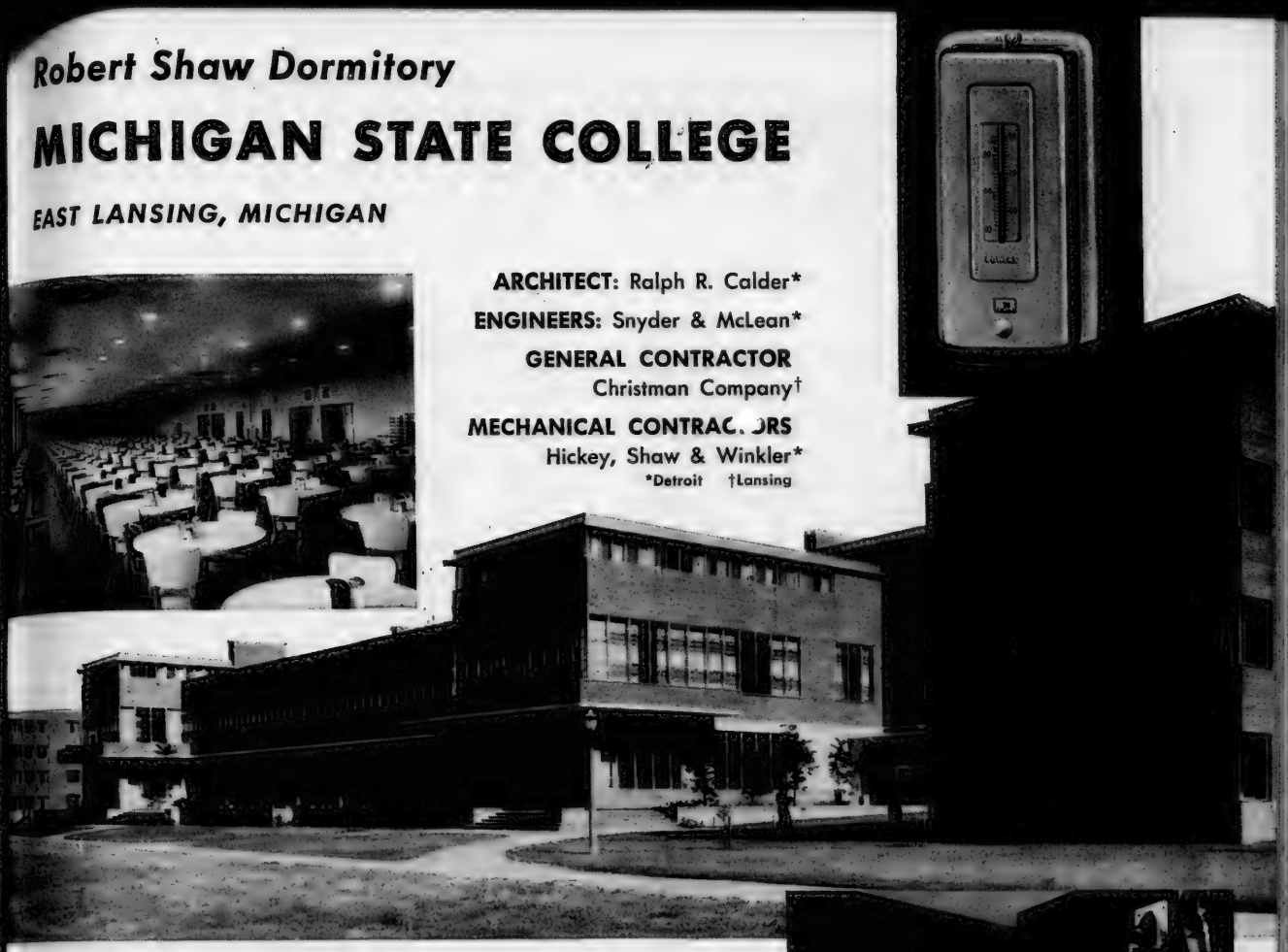
EAST LANSING, MICHIGAN

ARCHITECT: Ralph R. Calder*

ENGINEERS: Snyder & McLean*

GENERAL CONTRACTOR
Christman Company†

MECHANICAL CONTRACTORS
Hickey, Shaw & Winkler*
*Detroit †Lansing



POWERS

Selected For The Heating And Ventilating System *And* **180** *Individual Shower Baths*

No compromise with safety or comfort in showers here.

After thorough tests and comparison with other shower regulators, Powers thermostatic water mixers were installed in Shaw Dormitory. Here are some of the reasons why:

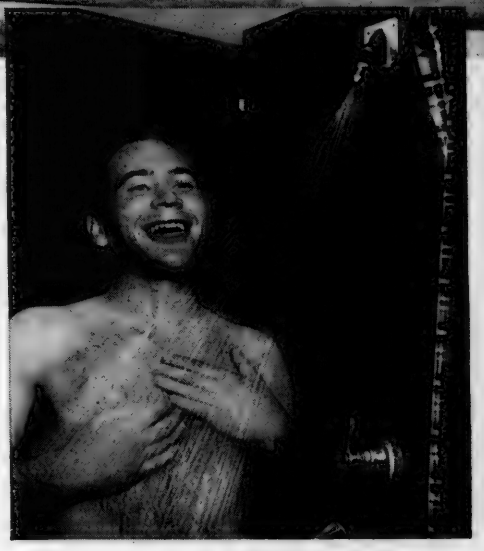
1. In a shower regulated by a Powers mixer—there's no danger of scalding nor slipping and falling while trying to dodge a "shot" of hot or cold water due to **pressure** or **temperature** changes in water supply lines.

2. Failure of cold water supply to a Powers mixer instantly and **completely** shuts off the shower delivery.

3. A sudden 100° F. rise in hot water supply is barely noticeable in a shower regulated by a Powers mixer. Being thermostatic it protects bathers from scalding caused by "dead ends" in hot water supply lines.

4. Temperature of shower is **thermostatically** limited to 115° F.

Why risk shower accidents, unfavorable publicity and time consuming law suits? It's more economical to install Powers thermostatic mixers . . . They cost more. Their safety features make them worth more!



Don McAuliffe, football star on Michigan State's 1952 National Collegiate Champions, enjoying one of the 180 Powers regulated showers in the Shaw Dormitory.

POWERS THERMOSTATIC WATER MIXER complies fully with Veterans Hospital safety requirements in Federal Specifications WW-P541a.

THE POWERS REGULATOR COMPANY
SKOKIE, ILLINOIS

OFFICES IN OVER 50 CITIES IN U.S.A., CANADA, AND MEXICO • SEE YOUR PHONE BOOK

(b43)

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

This NEW METHOD DRIES AIR

PRECISELY AS YOU WANT IT

NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

Most compact, taking less space for installation.

Inexpensive to operate because . . . no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

For complete information write

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. HV, 405 Lexington Ave. New York 17, N. Y.

Sales Engineers in Principal Cities of U. S. and Canada

THERMOCOUPLE TABLES

(*Continued from page* 128)

• **HOW.**—Each member firm of the SAMA that supplies iron-constantan thermocouples was invited to submit sample thermocouples for investigation at NBS. These samples were to be of commercial materials selected to match closely the 1913 table over the range from 32 to 1,400F. Eight different lots of matched iron and constantan wires of size approximately No. 8 AWG were submitted. Information received from some of the suppliers indicated that the iron samples came from at least four different basic sources of ingot iron.

The thermal emf's of the various wires were measured in the NBS temperature measurements laboratory from —319.5 to +1,800F. From these data, the corresponding thermal emf's for the iron-constantan thermocouples were computed. Chemical and spectrographic analysis of the iron samples and hardness determinations were also made.

As a result of the NBS investigation, the SAMA has recommended adoption of the temperature-emf relationship of one of the thermocouples studied, as a standard to replace the 1913 table. The temperature-emf relationship selected deviates least from the 1913 table in the range of normal use. The upper limit of the tentative standard has been set at 1,600F because of the instability of iron-constantan thermocouples above this temperature and also because of the large increase in the deviation of the thermocouples studied by NBS from each other above this temperature.

• **RESULT.**—In the course of the investigation, the Bureau invited suggestions from industry as to whether the new temperature-emf relationship would be acceptable as a standard. The replies received were uniformly favorable to an industry-wide standard. Also, users and suppliers of thermocouples based on the 1913 table were consistently favorable to the adoption of the relationship obtained by NBS, which is similar to the 1913 table. However, most of the replies received from users and suppliers of solely RP1080-type thermocouples indicated that it would not be practicable for them to change to the proposed SAMA standard. Change from the RP1080-type thermocouples to thermocouples based on the new proposed standard would require alterations to most of the associated indicating equipment, whereas the difference between the 1913 and the new NBS-derived relationships is much smaller and is less than commercial tolerances for this thermocouple.

Thus it appears that at least two standards, the SAMA table and the RP1080 table, will coexist in the immediate future. Most commercial production of iron-constantan will probably be based on the SAMA table, as it has been based on the 1913 table in the past. On the other hand, one of the principal fields in which the RP1080 table is dominant—namely, piston-engined military aircraft—is declining in importance. Eventual adoption of an all-industry standard must of necessity depend upon the kinds of commercial iron that are available and the industrial uses to which iron-constantan thermocouples are to be put.

For Strength and Stiffness Nothing Beats Galvanized Steel

Look at each of the materials commonly used for ductwork, and you realize the strongest and stiffest of them all is steel.

That's why a galvanized steel sheet has less tendency to buckle or kink in handling. Less bracing is needed. Longer unsupported sections can be used. And there is better resistance to damage from rough handling.

Bethlehem galvanized steel sheets are made from strong, durable steel, either plain or copper-bearing. Tight, uniform zinc coating guards them against corrosion. They are easy to cut, form, seam and solder. And they give a bright, clean look to any kind of sheet-metal job.

Bethlehem GALVANIZED Steel Sheets

★ BETHLEHEM STEEL ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

NEWS BRIEFS

• Methods for the evaluation of plastic pipe will be established in an extensive engineering research program now underway at Battelle Memorial Institute, Columbus, Ohio. This program is being sponsored by twenty-nine companies in The Society of the Plastics Industry, Inc., and will develop effective test methods on such factors as bursting strengths, safe working pressures, long range serviceability of plastic pipe under static pressure and dynamic loading, such as occurs with water hammers and reciprocating pumps.

• Charles C. Cheyney, a director and sales manager of Buffalo Forge Co. has been elected vice president of sales and engineering. Mr. Cheyney was made assistant sales manager in 1928. He became sales manager in 1945 and in 1949 was elected a director.

• Frank Hudik of Maywood, N. J., a veteran in the air conditioning field and president of Comfortair Co., of Hackensack, N. J., has been named chairman of a new Air Conditioning Requirements Committee of the Federal Housing Administration. The appointment was made on nomination of the Refrigerating Trades Association, of Washington, D. C. Other members of the committee serving with Mr. Hudik are Fred Boxall, president of the Bahnson Co., of Winston-Salem, N. C.; and James L. Hoyer, a consulting engineer, of Washington, D. C. The committee was set up to establish standards for residential air conditioning for the F.H.A.

• Wagner Electric Corp., St. Louis, Mo., announces the election of Edward G. Holtzman as assistant secretary and assistant treasurer, succeeding L. W. McBride who has accepted the position as executive vice president of Paxton and Gallagher Co. at Omaha, Neb. Since joining the company in 1942, Mr. Holtzman has been associated with industrial relations activities, and at the time of his appointment was labor relations manager. He is succeeded by Truman L. King.

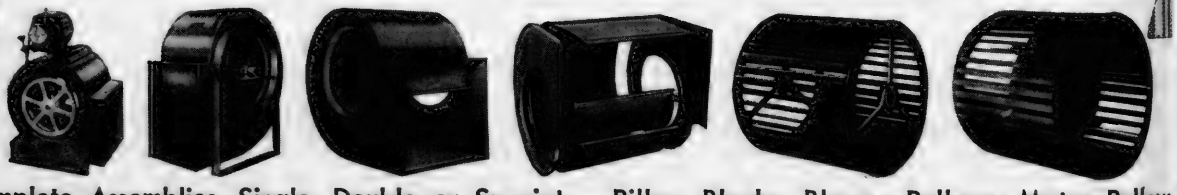
• McQuay, Inc., Minneapolis, manufacturers of heating, air conditioning, and commercial refrigeration equipment, announces the election of Byron E. James to the board of directors of McQuay, Inc. Mr. James rejoined McQuay as vice president in charge of engineering and research. Previously, he had been associated with the York Corporation, York, Pennsylvania.

• Harold W. Sweatt, president of Minneapolis-Honeywell Regulator Co. since 1934, was recently elected chairman of the board, succeeding Mark C. Honeywell, who was named honorary chairman. Paul B. Wishart, vice president and general manager of the company, was elected to succeed Mr. Sweatt as president. Two other officers of the company were elected directors, enlarging the board's membership to 10. The new directors are Tom McDonald, vice president in charge of sales, and A. M. Wilson, vice president in charge of the firm's Aeronautical Division.

The MASSACHUSETTS Line

A.C. Blowers · DESIGN 2

FOR A COMPLETE SELECTION



Complete Assemblies, Single, Double or Special Width; Housings, Housing Sides; Cutoff Plate; Scroll Sheet; Type "SP" Standard Wheel; Type "C" Wheel —for higher than normal speeds and pressures.

Pillow Blocks; Blower Pulleys; Motor Pulleys. Complete dimensional tables & NAFM approved ratings. *Write for Bulletin No. 115. Representatives in principal cities.*

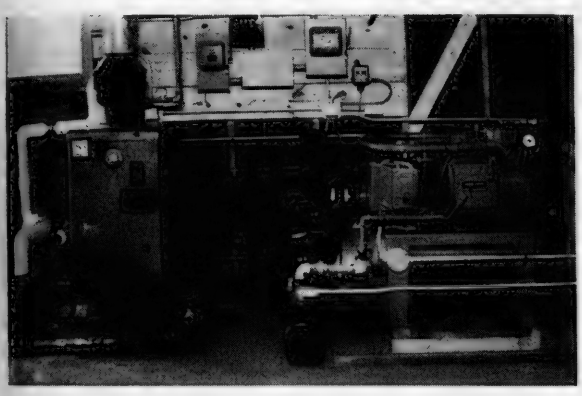
MASSACHUSETTS BLOWER DIVISION

The BISHOP & BABCOCK Mfg. Co.

4901 HAMILTON AVENUE · CLEVELAND 14, OHIO

FOR ALL THE COMFORTS OF HOME

Acme central air conditioning



Cool, quiet, year round comfort was the thing Mr. Olin G. Rivoire was searching for when he installed his central air conditioning system. He wanted no bulky cabinets hanging from windows around his home, he wanted no massive cabinet taking up space in his home, he wanted no unit that was going to require constant adjusting and maintenance. The result of his wants was the installation of an Acme Flow-Cold Liquid Chiller. Used in conjunction with a Pennco Hot Water Boiler and a central air handling unit — the Flow-Cold gave him year-round air conditioning. This whole heating and cooling system was installed in one corner of his garage — thus saving all the room in his house for living space.

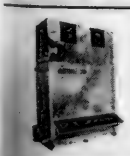
The cooling load of 5 tons is easily handled by the 5 HP Flow-Cold unit. You, too, can have the pleasure of central station air conditioning. Every room in your house can be cooled from one unit installed in your garage, basement or utility room. Look in the pages of your telephone directory for the nearest Acme Flow-Cold representative. He can help you adapt a Flow-Cold to your present heating system so you'll have year 'round comfort.

ACME AIR CONDITIONING REFRIGERATION

ACME INDUSTRIES, INC.

Mfgs. of a complete line of Air Conditioning and Refrigeration Equipment

JACKSON, MICHIGAN



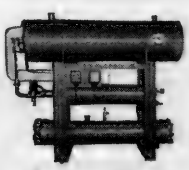
Evaporative Condensers
Cooling Towers
Floor-type Unit Coolers

Direct Expansion (Dry-Ex) and Flooded Liquid Chillers

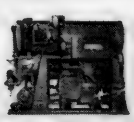
Heat Exchangers, Oil Separators

Shell and Tube, Shell and Coil Condensers

Receivers, Pipe Coils

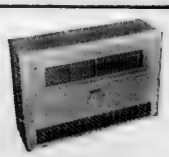


Packaged Liquid Chillers to 225 tons



Flow-Temp Heat Pumps

Flow-Cold Liquid Chillers



Remote Room Conditioner

Continuously serving the air conditioning and refrigeration industry since 1919

To solve any space condition, specify

AGITAIR

For correct air distribution to suit any space condition, AGITAIR square and rectangular diffusers have no equal. Custom-designed with built-in diffusing vanes, in a wide variety of louver patterns, they provide blows in 1, 2, 3 or 4 directions without use of blank-offs. AGITAIR diffusers need not be centrally located in the area to be served.

Advantages of AGITAIR'S exclusive air pattern control feature are greater design freedom for achitects and engineers, certified 100% draftless air distribution from any ceiling or sidewall location, maximum economy in duct runs.

New 34-page Type R Catalog reveals how correct air distribution is simplified by AGITAIR. Contact your local AGITAIR representative, or write us direct for your free copy.

AIR DEVICES INC.
185 Madison Avenue, New York 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS

DEGREE-DAYS FOR NOVEMBER, 1953

(A) Airport readings; (C) city office readings;
(O) Readings at a point on outskirts of city.

HEATING AND VENTILATING'S 26th Year of Publication of Monthly Degree-Day Data

City	November		
	1953	1952	Normal
Abilene, Texas (A)	352	385	350
Albany, New York (A)	681	747	780
Albuquerque, New Mexico (A)	554	740	630
Alpena, Michigan (C)	721	797	864
Anaconda, Montana (C)	777	1059	951*
Asheville, North Carolina (C)	546	563	552
Atlanta, Georgia (C)	365	359	393
Atlantic City, New Jersey (C)	438	480	507
Augusta, Georgia (A)	392	331	282
Baltimore, Maryland (C)	454	457	489
Billings, Montana (A)	639	947	876
Binghamton, New York (C)	650	661	735
Birmingham, Alabama (A)	394	393	396
Bismarck, North Dakota (A)	861	1031	1098
Block Island, Rhode Island (A)	490	563	591
Boise, Idaho (A)	582	894	762
Boston, Massachusetts (A)	487	595	618
Bozeman, Montana (C)	790	1111	1006
Buffalo, New York (A)	626	654	753*
Burlington, Iowa (A)	646	685	765
Burlington, Vermont (A)	676	755	858
Butte, Montana (C)	818	1193	923*
Cairo Illinois (C)	478	484	492
Charleston, South Carolina (C)	274	289	214
Charlotte, North Carolina (C)	402	411	438
Chattanooga, Tennessee (A)	491	489	477
Cheyenne, Wyoming (A)	775	1083	897
Chicago, Illinois (C)	574	605	696*
Cincinnati, Ohio (C)	518	518	567
Cleveland, Ohio (A)	590	623	699
Columbia, Missouri (A)	548	621	654
Columbia, South Carolina (C)	302	269	308
Columbus, Ohio (C)	533	615	654
Concord, New Hampshire (A)	711	807	849
Concordia, Kansas (C)	639	732	687
Dallas, Texas (A)	314	347	299
Dayton, Ohio (A)	616	653	693
Deer Lodge, Montana (C)	790	1186	1055*
Denver, Colorado (C)	649	971	771
Des Moines, Iowa (A)	665	776	798
Detroit, Michigan (A)	609	660	747
Devils Lake, North Dakota (C)	920	1056	1197
Dodge City, Kansas (A)	635	729	669
Dubuque, Iowa (C)	741	801	882
Duluth, Minnesota (C)	932	1032	1092
Eastport, Maine (A)	(a)	772	798
Elkins, West Virginia (A)	787	682	726
El Paso, Texas (A)	329	459	390
Ely, Nevada (A)	809	1138	894
Erie, Pennsylvania (C)	(a)	571	672
Escanaba, Michigan (C)	772	828	933
Evansville, Indiana (A)	573	564	570
Fargo, North Dakota	892	1020	1122
Fort Smith, Arkansas (A)	462	506	435
Fort Wayne, Indiana (A)	666	706	759
Fort Worth, Texas (A)	334	341	299
Fresno, California (A)	312	366	315
Galveston, Texas (C)	117	168	131
Grand Junction, Colorado (A)	667	867	792
Grand Rapids, Michigan (A)	671	681	822
Green Bay, Wisconsin (C)	763	844	945
Greensboro, North Carolina (A)	489	490	510
Greenville, South Carolina (A)	371	386	450
Harrisburg, Pennsylvania (A)	614	608	630
Hartford, Connecticut (A)	616	671	705
Hatteras, North Carolina (C)	254	245	244
Havre, Montana (C)	760	1014	1023
Helena, Montana (A)	785	1157	999
Houston, Texas (C)	138	218	162
Huron, South Dakota (A)	826	934	975
Indianapolis, Indiana (A)	635	655	705
Jackson, Mississippi (A)	315	350	310
Kansas City, Missouri (A)	522	605	621
Knoxville, Tennessee (A)	503	538	498
La Crosse, Wisconsin (A)	744	800	921
Lander, Wyoming (A)	825	1147	1050
Lansing, Michigan (A)	679	736	813
Lewiston, Maine (O)	771	780	876*
Lincoln, Nebraska (C)	670	756	741
Little Rock, Arkansas (A)	415	448	405

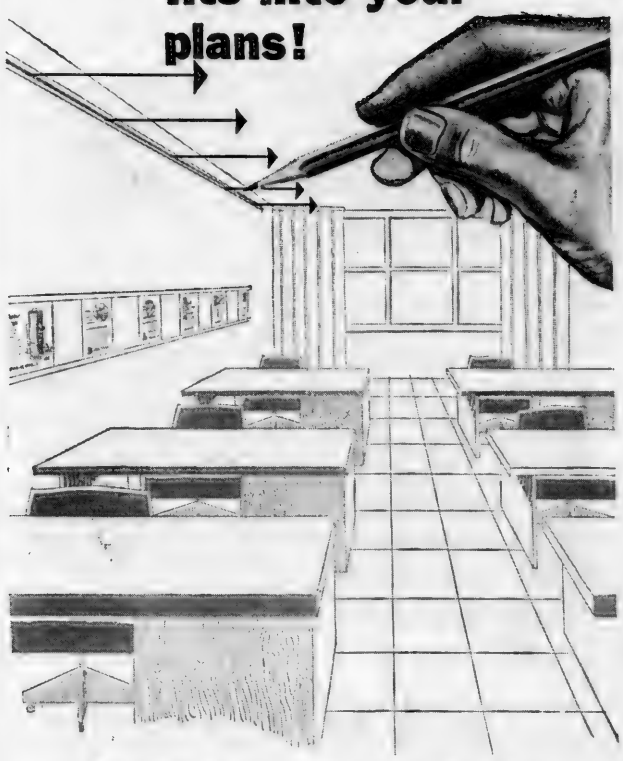
City	November		
	1953	1952	Normal
Livingston, Montana (C)	682	988	864*
Los Angeles, California (C)	97	201	140
Louisville, Kentucky (A)	552	538	579
Lynchburg, Virginia (A)	504	498	531
Macon, Georgia (A)	329	150	280
Madison, Wisconsin (C)	728	753	864
Marquette, Michigan (C)	760	840	933
Memphis, Tennessee (A)	433	469	432
Meridian, Mississippi (A)	349	357	338
Milwaukee, Wisconsin (A)	682	749	831
Minneapolis, Minnesota (A)	767	883	960
Moline, Illinois	660	702	786
Montgomery, Alabama (A)	319	335	304
Nantucket, Massachusetts (A)	505	571	615
Nashville, Tennessee (A)	502	492	471
New Haven, Connecticut (A)	610	607	663
New Orleans, Louisiana (C)	125	174	141
New York, New York (C)	458	501	561
Newark, New Jersey	523	549	603
Norfolk, Virginia (C)	403	338	408
North Head, Washington (C)	(a)	520	486
North Platte, Nebraska (A)	819	1014	846
Oakland, California (C)	278	354	336
Oklahoma City, Oklahoma (C)	443	497	459
Omaha, Nebraska (A)	620	777	783
Parkersburg, West Virginia (C)	593	559	600
Peoria, Illinois (A)	654	670	759
Philadelphia, Pennsylvania (C)	464	487	516
Phoenix, Arizona (A)	148	236	182
Pittsburgh, Pennsylvania (C)	534	531	612
Pocatello, Idaho (A)	678	1121	873
Portland, Maine (A)	708	813	825
Portland, Oregon (C)	420	653	534
Providence, Rhode Island (A)	570	571	672
Pueblo, Colorado (A)	638	930	771
Raleigh, North Carolina (C)	395	378	387
Rapid City, South Dakota (A)	691	913	891
Reading, Pennsylvania (C)	571	574	588
Red Bluff, California (A)	331	370	319
Reno, Nevada (A)	675	907	744
Richmond, Virginia (C)	488	460	498
Rochester, New York (A)	624	659	759
Roswell, New Mexico (A)	480	616	501
Sacramento, California (C)	302	(a)	321
St. Joseph, Missouri (A)	595	702	600
St. Louis, Missouri (C)	473	528	570
Salt Lake City, Utah (A)	560	915	771
San Antonio, Texas (A)	198	250	201
San Diego, California (A)	86	171	147
Sandusky, Ohio (C)	560	598	684
San Francisco, California (C)	242	271	237
Sault Ste. Marie, Michigan (A)	793	904	1005
Savannah, Georgia (A)	291	230	225
Scranton, Pennsylvania (C)	644	645	693
Seattle, Washington (C)	454	580	540
Sheridan, Wyoming (A)	765	1019	957
Shreveport, Louisiana (A)	328	342	305
Sioux City, Iowa (A)	730	855	885
Spokane, Washington (A)	733	961	879
Springfield, Illinois (C)	559	582	666
Springfield, Missouri (A)	548	623	615
Syracuse, New York (A)	626	628	714
Tacoma, Washington (C)	(a)	648	579
Terre Haute, Indiana (A)	635	647	681
Toledo, Ohio (A)	647	668	756
Topeka, Kansas (C)	544	662	630
Trenton, New Jersey (C)	535	544	582
Utica, New York (O)	665	715	781*
Valentine, Nebraska (C)	726	973	891
Walla Walla, Washington (C)	546	859	675
Washington, D. C. (C)	488	478	510
Wichita, Kansas (A)	542	643	597
Williston, North Dakota (C)	815	1000	1101
Winnemucca, Nevada (C)	707	1013	822
Yakima, Washington (A)	701	952	807

(a) Data not available.

*Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

Figures in this table, with seven exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y.; and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company.

See how inconspicuously STRIPLINE fits into your plans!



Unlimited air distribution provided by slender continuous diffusers ...another AGITAIR first!

Stripline diffusers offer complete application versatility. They are ideal for installation in shallow lighting coves...window stools for air curtaining of glass windows or exposed wall areas...side of furred beams... or as a decorative border blanketing the entire area with noiseless, draftless air distribution. Custom built with AGITAIR's patented diffusing vanes, Stripline diffusers create maximum mixing and aspiration... quick temperature equalization and correct air distribution over any desired length.

Write for your free copy of Catalog S-100 today.

AGITAIR STRIPLINE

AIR DEVICES INC.

185 Madison Avenue, New York 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS

Govern air conditioning costs...

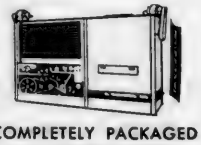
with GOVERNAIR!

Governair keeps costs under control — as well as giving you *governed air!*

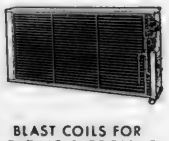
The Governair fan and coil cabinet unit shown above is a deluxe component of high quality air conditioning systems that employ directly expanded refrigerants or chilled water. A large capacity air handler especially designed for installations where space limitations exist. Heating is accomplished by the use of steam or hot water.

For the answer to your air conditioning costs and problems, call on Governair — *the *originators of packaged air conditioners!*

AIR CONDITIONERS



COMPLETELY PACKAGED AIR CONDITIONERS*



BLAST COILS FOR HEATING & COOLING

*Type SCU Conditioners — Patent No. 2,297,928

GOVERNAIR

TYPE SC CONDITIONERS

Governair Corporation, 513 N. Blackwelder, Oklahoma City, Okla.

ABSTRACTS AND REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

PLANNING GUIDE FOR RADIOLOGIC INSTALLATIONS

Engineers will obtain a better understanding of what is required for an efficient radiologic installation after studying the information presented in Planning Guide for Radiologic Installations.

The American College of Radiology and its Committee on Planning of Radiologic Installations have had a major part in the preparation of this book. Actually, it was a joint project by radiologists, representatives of companies manufacturing x-ray equipment and film, federal health agencies, the American Hospital Association and the American Institute of Architects.

This guide covers hospital practice, architectural problems and procedures in planning a radiology department or office, rooms for fluoroscopy, ventilation and air conditioning, the darkroom and film processing facilities, photofluorographic installations, requirements for radiographic equipment, mobile x-ray equipment, radiation protection, design and recommendations for the radioisotope laboratory, facilities for radium storage, preparation and transportation. In a large appendix, there is information on x-ray protection design, and protection against radium, Cobalt-60 and Cesium-137.

Since the field of radiology is highly specialized, many engineers who are called upon to work with others in hospital and laboratory design, will welcome the information presented in this book.

Planning Guide for Radiologic Installations. Cloth bound, 7 x 10 inches, 336 pages. Published by Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, Ill. Price, $8.

• • •

SERVICE-WEIGHT CAST IRON SOIL PIPE AND FITTINGS—A voluntary standard of the trade covering service-weight cast iron soil pipe and fittings has been released by the U. S. Department of Commerce. It is intended to serve as a basis for common understanding between buyers and sellers. Besides giving basic dimensions and weights, this standard also includes general requirements and inspection and testing. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, 25 cents.

CAST IRON SCREWED DRAINAGE FITTINGS—Following a thorough study of 1942 Standard, a committee recommended that several changes be made to bring the data in line with current production and uses. As a result, ASA B16.12-1953 has been adopted by the American Standards Association. The American Society of Mechanical Engineers is the administrative sponsor. American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y. Price, $1.

"I STARTED SCHOOL AT 40

Typhoon Regional Training School, that is!"...

At the Typhoon training school they set up in my city I learned how to make more money out of air conditioning. I got straight-from-the-shoulder facts about the air conditioning business – how to estimate it, install it and service it – how to promote it, sell it and make dough on it. Everybody in my shop is going to graduate from this school—it's a real service Typhoon is doing for its dealers! No wonder they call Typhoon the most cooperative factory in the business.

You Profit 5 Ways with a Typhoon Franchise . . .

1. CLOSE FACTORY COOPERATION—You deal direct with the Typhoon factory. Every member of the organization is ready to pitch in and work with you personally—from the service manager or chief engineer right on up to the president.

2. YOUR PARTNER, THE DISTRICT MANAGER—when there's a complicated job to figure, when the sale hangs in the balance... your Typhoon district manager is Johnny-on-the-spot.

3. TOPNOTCH ENGINEERING—Typhoon units are ruggedly built with plenty of reserve capacity... they deliver full rated performance under peak load conditions.

4. COMPLETE LINE of packaged air conditioners from 2 to 25 tons. You always have just the size unit your customer wants – when he wants it – competitively priced. You're set up to handle any job in town – efficiently, economically.

5. REGIONAL TRAINING SCHOOLS—intensive sales-engineering course by factory experts, conducted in your own territory. Every employee who attends is worth more money to you!

Air Conditioning Units 2 to 25 tons ● Multi-Packaged Systems up to 60 tons ● Evaporative Condensers ● Packaged Water Chillers ● Air Handling Units

And Typhoon leads in air conditioning for the home—with a complete line of year-round heating-cooling units and heat pumps.

Write for information about a Typhoon franchise in your territory

TYPHOON AIR CONDITIONING CO., INC.
794 Union Street
Brooklyn 15, N. Y.

TYPHOON

Specialists in air conditioning since 1909

V-1

Typhoon Air Conditioning Co., Inc.
794 Union St., Brooklyn 15, N. Y.

I would like to know more about the Typhoon Franchise.

Name_____

Firm_____

Address_____

City_____ Zone_____ State_____

HOSPITALS

SCHOOLS

PUBLIC, CIVIC, BUILDINGS

KITCHENS & LAUNDRIES

FOOD PROCESSING PLANTS

ANY AIR . . . ANYWHERE . . . foul or moist, stale or dry, smoky or gaseous . . . it's up and out quickly with a Muckle Vent. Proven, tested performance of Muckle Vents guarantees superior efficiency on any building, new or old, under any conditions. Architects, designers and builders who compare - specify reliable Muckle Vents.
For greater working efficiency or controlled customer comfort . . . you can depend on Muckle Vents. Streamlined, propeller driven, roof mounted . . . motor out of air stream . . . easy to install . . . available in 15 sizes from 254 CFM to 10280 CFM.

MOISTURE IS NO PROBLEM!

Muckle Vents are especially designed for maximum operating efficiency in removing moisture, filled air

Write today for FREE information on industry wide application

Muckle MANUFACTURING COMPANY

OWATONNA 3, MINNESOTA

• The Cleveland Electric Illuminating Co. recently announced that installation has been completed on the first reverse cycle heat pump for private home use in northern Ohio. The pump will be operated under laboratory control conditions in an all-electric ranch home owned by George W. Britton. Mr. Britton and the company will carry out a two-year experiment to determine the pump's operating and performance characteristics for this region.

• The appointment of Robert E. Halloran to the newly-created position of manager of mechanical sales, was announced recently by the Tubular Products Division of The Babcock & Wilcox Co. Mr. Halloran will make his headquarters in Beaver Falls.

• The first three-day Industrial Ventilation Conference, sponsored jointly by the New York State Labor Department's Division of Industrial Hygiene, and Syracuse University, will be held at the University's Maxwell Hall on February 1st, 2nd and 3rd, 1954. The purpose of the conference is to acquaint plant engineers, safety and industrial hygiene personnel, sheet metal contractors, and ventilation engineers with latest information on the design of industrial exhaust systems.

• Robert W. Lear has been appointed general marketing manager of the plumbing and radiator heating division of American Radiator & Standard Sanitary Corporation. At the same time it was announced that Robert W. Williams has been appointed advertising and sales promotion manager, succeeding Mr. Lear.

WHAT READERS SAY

Excess Radiation in Schools

EDITOR, HEATING AND VENTILATING:

In your December issue there is an article entitled "New Design Method for School Systems Cuts Cost" by Mr. L. R. Fuller of the Trane Company.

I heartily agree with what he says. In fact I would go further.

Excess radiation makes temperature control difficult. The greater the excess, the greater the difficulty. This is obvious because excess radiation increases the amount of heating capacity which has to be eliminated by the control.

Unit ventilators are rated on 2 lb steam pressure. Any school boiler can put at least 5 lb and up to 10 lb pressure on the job if necessary. The capacity is increased 5 to 13 per cent. Why not select the units on these higher pressures?

As to the outdoor temperature, why stop at the 97½ per cent suggested by the ASHVE? Any building has a thermal storage capacity which enables it to coast along over the few hours of extremely low temperatures, which always take place outside of heating hours anyway.

From personal observation of many jobs where the temperature control is by sub-atmospheric steam, I have seldom if ever seen pressure above atmosphere to heat up or maintain the heat in the severest weather. This is a

(*Continued on page* 140)

HEATING AND VENTILATING'S *Ad-Digest* SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

NOTE: While every attempt is made to list all advertisements, those which are received after the published closing date may not appear. The Index of Advertisers lists all the advertisements in this issue.

TEMPERATURE CONTROL. Page 15. How an Indiana school was equipped with this pneumatic system of temperature control in 1924 and today 29 years later is still giving even control as shown by temperature charts. Information available. ----------Item 201

DIRECT FIRED HEATERS. Page 142. A line of direct fired heaters in six different types and with capacities ranging from 200,000 to 2,000,000 Btu per hour for burning oil or gas. Information and specifications available.----------Item 202

REGISTERS. Page 25. A line of floor registers giving positive heat control and with a set screw arrangement to give easy balancing and trouble free operation. Also a multiple valve register adjustable so that the flow of air may be directed in any direction. Pocket catalog available. ----------Item 203

GLASS INSULATION. Page 50. Fine fiber glass insulating blankets for furnace casings and other applications and which will withstand temperatures up to 450 degrees. Another type also available to withstand 600 degrees. Advertisement shows how insulation is applied.----------Item 204

FUEL BURNING EQUIPMENT. Page 34. Dual or triple fuel-firing with oil, gas or coal is available for commercial and industrial installations. Case history is cited where almost half the seasonal cost of fuel was saved because of ability to change from fuel to fuel. Information available. ----------Item 205

UNIT HEATERS. Page 38. A line of unit heaters in regular or king size in suspended or floor mounted types. In all, 63 models and sizes to draw on. This line means maximum satisfaction to your customers and maximum profits to you year after year. Descriptive literature available.----------Item 206

DAMPER HARDWARE. Page 143. Damper hardware kit with self-centering bracket, corrosion resistant materials, and which fit all blades three inches or wider in parallel or opposed blade action. Illustrated manual available.----------Item 207

DUCT INSULATION. Page 47. A brochure on duct insulation for residential air conditioning covering how-to-do-it as well as where, when and why is available from this manufacturer of glass fiber duct insulation of the thermal and acoustical types. Brochure available on request. ----------Item 208

WATER MIXERS. Page 129. Water mixers for the showers in a mid-west college dormitory are of the thermostatic type which instantly and completely shut off in case of failure of cold water supply and the temperature of the shower is thermostatically limited to 115 degrees. Shower accidents are avoided.----------Item 209

WELDING FITTINGS. Page 41. Your welding fittings distributor is on your buying team and can fill all your requirements for welding fittings and flanges covering over 4,000 different items.----------Item 210

DUCT FANS. Page 1. These fans exhaust fumes at top efficiency and are placed in the duct work but with the motor chamber completely isolated from the exhaust stream. Available in a wide range of sizes. A booklet on design data for exhaust systems available without charge.----Item 211

SNOW MELTING. Page 13. Advantages of snow melting systems outlined and the application of steel pipe to such systems explained. Thirty-two page color booklet, "Steel Pipe Snow Melting and Ice Removal Systems," available without charge. ----------Item 212

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PLEASE SEND US MORE INFORMATION.

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
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271	272	273	274	275	276	277	278	279	280	281	282	283	284
285	286	287	288	289	290	291							

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Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone**.....**State** .....

This card is void after Apr. 1, 1954

Ad-Digest SERVICE

WELDING FITTINGS. Page 46. This company over twenty years ago announced the first comprehensive line of butt-welding fittings. Good example is the line of reducers, today available in 175 sizes in standard weight alone.....Item 213

PRESSURE RELIEF VALVES. Back cover. A comprehensive booklet on the selection and sizing of pressure relief valves. ASME boiler code is explicit about using relief valves with capacity rating to match the gross output of the boiler. The trouble is data on boiler output are not always available. This book includes such data and gives essential engineering information to select relief valves. Booklet is free.
.....Item 214

AIR FILTER. Page 12-13. A high velocity one-inch filter which holds more dirt than other one-inch filters. All metal, it needs no extensive, never ending replacements. Said to be as efficient as most two-inch types and filters half again as much clean air because of 50% greater capacity. Performance curves are given. Bulletin available.....Item 215

AIR CONDITIONING. Page 30-31. A complete line of year round air conditioning products including water coils, floor air conditioning units, horizontal and down flow unit heaters, packaged air conditioner, direct expansion coils, heating and ventilating units, heating coils, and floor mounted unit heaters. Information available.....Item 216

EXPANSION JOINTS. Page 23. Expansion compensator in ¾, 1, 1¼ and 2 inch sizes for use in hot water or low pressure steam systems. The cost is moderate and puts an end to leakage and to pipe creeping noises by uncontrolled expansion. This is a new device. Bulletin available....Item 217

AIR RECOVERY. Page 119. Every $100 invested in air recovery equipment will save your client $400 on original equipment and every dollar spent for maintenance of air recovery equipment will reduce operating cost $4.00. Fact-packed bulletin available.
.....Item 218

COOLING TOWERS. Page 123. Compact cooling towers are of growing importance in residential cooling and this tower achieves maximum cooling without noise. Can be located in basement, garage, or yard, and is designed specifically for home use. Bulletins available.....Item 219

BLOWERS. Page 53. Quietest, most efficient and trouble-free blower in this company's long history of manufacturing air moving equipment. Has bell shaped inlet, fixed inlet vanes, and new rotor shroud. Bulletin available.....Item 220

TANK DRAIN. Page 52. A tank drain for hot water expansion tanks not so equipped. This drain makes the draining of waterlogged expansion tanks simple, quick and positive. Information available.
.....Item 221

EXPANSION JOINTS. Page 49. With this slip-type expansion joint, you need fewer joints because each sliding sleeve has a traverse of 4, 8 or 12 inches. Due to the method of gun-packing used, there is no need for shut-down. The joints are serviced under full steam pressure. Bulletin available.....Item 222

ELECTRONIC AIR CLEANING. Page 45. A bulletin of interest to every engineering department and dealing with filtration problems in industrial ventilation. Includes diagrams on the company's new electric precipitator.....Item 223

VIBRATION ISOLATION. Page 56. A new bulletin describing the first really engineered approach to the problem of isolating vibration and noise produced by heavy fans, blowers, compressors and other equipment.....Item 224

FREON COMPRESSOR. Page 48. A Freon compressor on which years were spent in development work. Unit is 6 cylinder, designed to operate in conjunction with the company's evaporative condensers. Complete range from 3 to 150 hp.....Item 225

HEATING CONTROLS. Page 20. This type heating control was selected for a large Seattle church which has no pew over 50 feet from the altar, is radiant heated and provides for large attendance. A weather compensated system was specified. Company has unusual engineering service. Catalog available.....Item 226

STEAM SPECIALTIES. Page 44. Announcing the purchase of a well known and long established steam specialty manufacturing company by an air filter maker.
.....Item 227

TEMPERATURE REGULATORS. Page 40. These regulators are guaranteed to shut tight when the demand for steam ceases. Expensive steam leaks due to a lack of tight shut off are eliminated. Bulletin available.....Item 228

AIR CONDITIONING. Page 36. This air conditioning equipment was selected for a large downtown hospital in New York City. Company makes coils, air conditioning units, multi-zone units, spray coils, dehumidifiers, cooling towers and evaporative condensers.....Item 229

STEAM COILS. Page 148. A line of steam coils with defroster for use in combination with air conditioning coils or as tempering or booster units in long heating ducts. Details available.....Item 230

CONDENSING UNITS. Page 28. A line of hermetic condensing units without belts, seals or manual oiling, and accessible for servicing on the spot. There is a unit for every type air conditioning installation from smallest to largest. Air cooled from ¼ to 3 hp., water cooled from ½ through 7½ hp. Details available.....Item 231

AIR CONDITIONING UNITS. Page 141. A line of air conditioning units which has a muggy air control, blow through design, anti-sweat construction, quiet operation and is designed for finished interiors. Bulletin available.....Item 232

AIR VELOCITY METER. Page 141. An instantaneous direct reading air velocity meter accurate in all ranges from high to low. Compact, portable, easy to understand and use. Bulletin available..Item 233

COOLING TOWERS. Page 22. How two 100 ton cooling towers of this make are installed on the roof of the newly reopened Fort Rotunda at Dearborn, Mich. These towers are designed to save up to 95% of normal water demand. Capacities from 20 to 100 tons or more. Also available for residential and light commercial use in a thrifty model.....Item 234

CONTROLS. Page 10-11. How the controls center principle was applied to a California school. The control center is located in the boiler room where at one point all electrical components of each unitary control system are connected. Unitary control components are installed and recessed behind wall cabinets so that no floor space is used, yet controls are readily accessible. Bulletin available.....Item 235

SHUTTERS. Page 144. An automatic shutter unusually sensitive to air current causing the louvers to open instantly when the fan is turned on and snap shut when the fan is turned off, and an automatic ceiling shutter for attic ventilation are two products in this line. Catalogs available.
.....Item 236

DIRECT FIRED HEATERS. Page 140. These heaters are almost ready to go to work for you the day they arrive. They are factory assembled and shipped as a complete unit. Available for gas, oil, coal or dual gas and oil. Step-by-step catalog available.....Item 237

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING
148 LAFAYETTE STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

PIPE INSULATION. Page 29. The lowest cost per installed linear foot of any hot underground pipe insulation. It is simply poured out of the bag onto the pipe and tamped down. Then trench is backfilled and the job is insulated. Available in three grades. Descriptive literature available. ----------Item 238

PIPING LAYOUTS. Page 24. A layout of a typical industrial waste treatment system showing the component parts and the placement of valves needed. A complete description and enlarged diagram of this layout free on request.----------Item 239

POWER TRANSMISSION. Page 26-27. This company's control-motor-drive combination on air conditioning jobs benefits the designer in three ways—engineering help, coordinated equipment and guaranteed performance. Engineering literature available.----------Item 240

CONTROLLED HUMIDITY. Page 130. A method of removing moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration are easily and positively controlled and determine the amount of moisture remaining in the leaving air. Information available.----------Item 241

BOILER TUBES. Page 55. Savings in time, labor, and money are assured to users of these tubes. They have all the way through uniform ductility and can be readily expanded into the tube seat which makes a joint which stays tighter longer.---Item 242

AIR HANDLING. Page 42. Air handling in connection with chemical research requires the right kind of air properly cleaned, conditioned, and humidified. Examples of equipment available from this company are individual laboratory exhaust fans, rubber covered and corrosion resistant. Information available.---Item 243

TEMPERATURE CONTROL. Page 110-111. Custom control designed for the client's individual heating, ventilating, air conditioning and industrial problem, is exemplified in a new building for Parker Pen's new plant in Janesville, Wis. Conditions in the offices and engineering department are considerably different from those in the plant. Information available. ----------Item 244

AIR DIFFUSERS. Page 135. An air diffuser of a strip type ideal for installation in shallow lighting coves and other places where the diffuser is exceedingly inconspicuous. Catalog available.---------Item 245

GAS UNIT HEATERS. Inside front cover. A line of gas unit heaters in 7 sizes with input ratings from 25,000 to 200,000 Btu per hour. Has automatic safety pilot, raised port burners, low speed motors, ten other features. Catalog available. ----------Item 246

CORROSION PROOF STRUCTURES. Page 149. Your answer to a need for corrosion proof exhaust systems, ducts, or tanks may lie in this rigid polyvinyl chloride material. Company fabricates the structure and furnishes all accessories. There will be no weak link in the corrosion proof installation. Bulletin available.----Item 247

BOILER WATER LEVEL CONTROL. Page 143. A boiler water level control which operates by magnetic force and has no bellows, diaphragms, or packing boxes. Available in a number of types. Bulletin available.----------Item 248

REMOTE ROOM CONDITIONER. Page 14. A system of air conditioning employing a central water chiller and central hot water heating boiler. Cold water is circulated in summer, hot water in winter, to the remotely located units which serve each room. Intended for year round air conditioning in multi-room installations. Literature available.----------Item 249

COPPER TUBE. Page 9. Easy to make solder joints are all you need with copper tube which comes in long lengths, cutting down the number of fittings required. A 50 page book on radiant panel heating is available.----------Item 250

RADIATOR TRAP. Page 2. A radiator trap which is big in service life, small in service cost. They hold steam in radiators or steam-using equipment until it has given up its useful heat. Available in ½, ¾ and 1 inch sizes. Choice of diaphragm or Sylphon bellows models. Bulletins available.----------Item 251

COPPER WATER TUBE. Page 107. You do not have to worry about wrench room in a tight corner, solder joints are made faster and a much cleaner appearance is presented with copper piping. Also, there is no need to worry about replacing the tube due to rust because the copper cannot rust. Company has a technical advisory service.----------Item 252

BLOWERS. Page 132. A complete selection of blowers, housings, scroll sheets, wheels and complete blowers. Bulletin available. ----------Item 253

WROUGHT IRON PIPE. Page 7. When you specify pipe remember that when you install it, you pay only the pipe fitter, but everytime you repair it you pay the fitter, carpenter, mason, plasterer and painter. In other words, though you pay more for wrought iron, you pay a lot less for maintenance.----------Item 254

PACKAGED AIR CONDITIONER. Page 147. A dual circuit central station packaged air conditioner combining two separate refrigeration circuits, two compressors, two motors, cooling section and evaporative condenser in one central station. Separate circuits permit continued dehumidification when operating at reduced capacity. Information available.---Item 255

Use this Digest to locate and refer to advertisements appearing in this issue of HEATING AND VENTILATING, then fill out and mail the prepaid postcard to request further information.

ROOF VENTILATORS. Page 138. These ventilators are streamlined, propeller driven, roof mounted, with motor out of air stream and easy to install. Available in 15 sizes from 254 to 10280 cfm. Information available.----------Item 256

STEAM TRAPS. Page 147. Freeze-proof steam traps for every plant use, drain completely when cold, and can be freely installed outdoors. In sizes from ¼ to 2 inch. Bulletin available.----------Item 257

FAN AND COIL CABINET. Page 138. This unit is a deluxe component of high quality air conditioning systems that employ directly expanded refrigerants or chilled water. Especially designed for installations where space limitations exist. ----------Item 258

UNIT HEATERS. Page 58-59. Steam, hot water and gas unit heaters. The gas fired heater tops the field with stainless steel heat exchangers and burners. The steam type has discharge air temperatures of 110 to 120 degrees, correctly related to air velocities. Also have a built-in velocity generator that steps up heat throw, eliminates stratification. Bulletins available. ----------Item 259

FIRE PROTECTION EQUIPMENT. Page 148. A complete line of interior fire protection equipment including 480 cabinets alone. Information available.------Item 260

STUD DRIVER. Page 139. Duct work can be anchored to concrete faster with this company's new break-open action powder-actuated tool. All types of concrete or steel fastenings can be similarly speeded. Literature available.----------Item 261

AIR CONDITIONING. Page 54. Air conditioning and refrigeration equipment made by a company with over 50 years experience in design to meet your specific cooling requirement. Catalogs available. ----------Item 262

EXTENDED SURFACE. Page 122. Extended surface heat exchange equipment for heating, cooling, process and air conditioning. Your local representative's recommendation means high efficiency, long service life, and low maintenance costs. ----------Item 263

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PLEASE SEND US MORE INFORMATION.

Circle below item numbers on which you wish further information.

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285	286	287	288	289	290	291							

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Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone**.....**State** .....

This card is void after Apr. 1, 1954

Ad-Digest SERVICE

STEEL PIPE. Page 34. A data book on the company's continuous weld pipe of low alloy steel with nickel-copper content and recommended for radiant heating, snow melting, brine lines and other industrial piping. Write for your copy.....Item 264

FLEXIBLE DUCTING. Page 144. A line of flexible duct made in sizes from 4 to 36 inches inside diameter, and which can be cut to length on the job with no weakening or ravelling. Has excellent air flow characteristics. Details available....Item 265

AIR DIFFUSERS. Page 134. Square and rectangular diffusers custom designed with built-in diffusing vanes in a wide variety of louver patterns. For ceiling or sidewall location. Catalog available.....Item 266

RADIANT HEATING. Page 57. Tubing for ceiling radiant heating systems, which is extra strong, ductile, and bends easily. Two men can easily position a group of joined coils. The tubing is double-walled and made from a single strip.....Item 267

UNIT HEATERS. Page 60. Horizontal unit heaters in 11 standard sizes, in downblast heaters in 12 sizes, and gas-fired unit heaters in 7 sizes. Seven advantages are listed. Bulletins available.....Item 268

AIR HANDLING EQUIPMENT. Page 33. Perfected engineering, precision manufacture, and certified ratings are advantages of this line of air handling equipment made by a company sixty years old. Line includes unit heaters, coils, fans and blowers. Information available....Item 269

TEMPERATURE CONTROL. Page 41. Pneumatic temperature control has simplicity, accuracy and economy. This system has been standard since the '80's. The operating cost is very low and the accuracy, dependability and adaptability are attested to by thousands of systems in use. .....Item 270

COOLING TOWERS. Page 127. A 20-year guarantee on the wettted deck surface made of pressure-treated wood in this line of cooling towers. The towers are made in sizes from 2 to 100 tons. Other features are listed.....Item 271

CENTRAL AIR CONDITIONING. Page 133. Residential air conditioning using a liquid chiller in summer and a hot water boiler in winter. A typical example is illustrated —it has a cooling load of 5 tons and the equipment was installed in one corner of the garage.....Item 272

ROTARY VENTILATORS. Page 148. Where the problem is ventilation, the solution is a rotary ventilator with or without fans. A two-mile per hour wind operates the unit and it continues to exhaust during wind lulls due to balanced design. Catalog available.....Item 273

COPPER PIPE. Page 21. Wet air cannot rust copper control piping, an installation of which is illustrated and described. The long length, light weight and elimination of many fittings by bending all make important savings in installation cost when this tubing is used. Bulletin available. .....Item 274

AIR DIFFUSERS. Page 51. These diffusers are the key to comfort in air conditioning. The aspiration principle of all these diffusers is the induction of room air into the outlet by the primary air stream. .....Item 275

INSULATED PIPING. Page 115. Forty years of manufacturing are behind this line of quality prefabricated insulated piping. Technical bulletin available. .....Item 276

MOTORS. Page 39. How this 63-year old line of motors can benefit your product. Built in ratings from 1/20 to 5 hp. and with hermetic motors from ⅛ to 20 hp. Bulletins available.....Item 277

TEMPERATURE REGULATORS. Page 146. Temperature regulators for accurate control of temperature of steam-heated hot water tanks, vats, and process tanks. Have hydraulically formed one piece bellows, small range spread and polished stainless steel valve stems. Information available. .....Item 278

INSULATION. Page 5. How multiple accordian aluminum fuel insulation protects a building against condensation within the walls and reduces heat transfer sharply at a low installed cost. Information available. .....Item 279

FUEL OIL HEATERS. Page 144. If high fuel oil temperatures are what you need, this indirect gas fired fuel oil heater is the answer. It gives any desired oil temperature without use of expensive electric boosters and is applicable to all types of oil-fired apparatus. Bulletin available. .....Item 280

HEATING SPECIALTIES. Page 37. Four reasons why it pays to specify this line of heating specialties include proven dependability, trouble-free service, complete line from one reliable manufacturer, nationally known and preferred by users. Information available. .....Item 281

FANS AND BLOWERS. Page 145. How some equipment in this line has been installed in a Long Island high school. .....Item 282

AIR FILTER. Page 117. An improved designed multi-duty filter is now available in 3, 4 and 5 foot sections so that a 9-foot wide filter with two sections is possible instead of three. In other words, an economical combination of filter widths to fit a limited space is possible. Bulletin available.....Item 283

AIR CONDITIONING. Page 137. This company has a regional training school to teach dealers how to make more money out of air conditioning. This service is for dealers who profit five ways with this company's franchise. Full line of equipment available.....Item 284

AIR FILTERS. Page 147. A line of air filters and grease filters which cost no more. They are the viscous type, permanent and cleanable. This also applies to the grease filter. Bulletins available. .....Item 285

AIR CONDITIONING COILS. Page 18. These coils give maximum heat transfer by heavy aluminum or copper fins; heavy galvanized steel casings. Fin spacing variable for ranges of temperature, air velocity, and humidity. Entire coil is custom-engineered. Catalog available. .....Item 286

SOLENOID VALVES. Page 113. A complete line of solenoid valves for Freon 12, Freon 22, methyl chloride and ammonia for liquid line, suction line or hot gas discharge service, for brine, water, steam or oil, and in a wide range of sizes. Special valves for special applications also available. Bulletins on request.....Item 287

PACKAGED AIR CONDITIONERS. Page 121. There are seven advantages in selling this line of packaged air conditioners, one being that your prospects know and respect the manufacturer's name. Others include more units in use, advanced engineering, low installation cost, dependability, completeness of line, national advertising and local selling help.....Item 288

ELECTRIC HEATING. Page 146. A portable comfort heating unit with thermostat which controls temperature in 40 to 80 degree F. range. Can be set to a point which will just prevent freezing, emits radiant and convected heat. Literature available.....Item 289

PIPING. Page 139. A special fabricating service to save time, material and labor in piping systems. Numerous flanged joints are eliminated and several fittings combined into one. All types of materials can be so fabricated in sizes from 3 to 48 inches in diameter. Bulletin available.....Item 290

AIR HANDLING EQUIPMENT. Page 17. A full line of revolving unit heaters, gas fired unit heaters, straight line duct fans, elbow type duct fans, draft inducer motor driven blowers, turbine driven blowers, and steam turbines. Made by a company whose name is a guarantee of economy and satisfactory performance. .....Item 291

Postage Will be paid by Addressee

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FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING

148 LAFAYETTE STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE

HOW TO SAVE MATERIAL and LABOR IN PIPING LAYOUTS

Here is a special fabricating service designed to save time, material and labor in piping systems. By eliminating numerous flanged joints and combining several fittings into one integral unit, as illustrated, Naylor fabrications provide the answer for greater efficiency and economy.

All types of materials can be fabricated accurately to your specifications. Sizes range from 3″ to 44″ in diameter and wall thicknesses up to ⅜″.

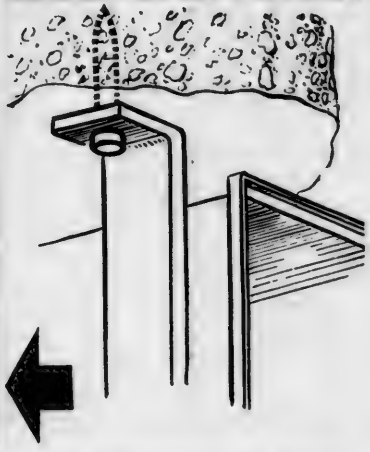
Naylor Bulletin No. 525 presents helpful information on this special service. Write for your copy today and submit your problem for recommendation and quotation.

NAYLOR PIPE

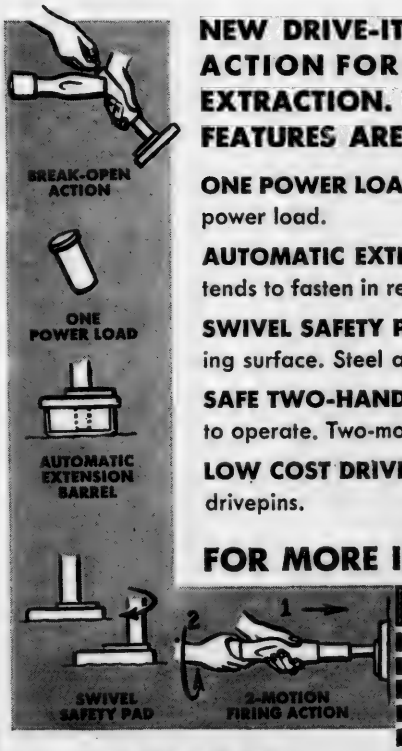
Naylor Pipe Company
1265 East 92nd St., Chicago 19, Illinois
Eastern U.S. and Foreign Sales Office
350 Madison Ave., New York 17, N.Y.

ANCHOR DUCTWORK TO CONCRETE FASTER

DRIVE-IT 320 WITH BREAK-OPEN ACTION



The ventilating ductwork in this large Ohio manufacturing plant was fastened to concrete with *DRIVE-IT* powder-operated fastening system. All types of concrete or steel fastenings can be speeded with *DRIVE-IT*—strap hangers, pipe hangers, conduit clamps, furring strips, and hundreds of other items.



NEW DRIVE-IT 320 FEATURES BREAK-OPEN ACTION FOR FAST, EASY LOADING AND EXTRACTION. OTHER JOB-PROVED DRIVE-IT FEATURES ARE:

ONE POWER LOAD. Variable penetration with one strength power load.

AUTOMATIC EXTENSION BARREL. Integral with tool. Extends to fasten in recesses.

SWIVEL SAFETY PAD. Swivels 360° to fasten near adjoining surface. Steel and tough Neoprene for protection.

SAFE TWO-HAND FIRING. Tool must be held against work to operate. Two-motion firing action for safety.

LOW COST DRIVEPINS. Prices are lower on wide range of drivepins.

FOR MORE INFORMATION

DRIVE-IT
the original
POWDER-ACTUATED TOOL

MAIL THIS COUPON

POWDER POWER TOOL CORP.
7526 S. W. Macadam Ave., Dept. A
Portland 1, Oregon

☐ Please send literature on DRIVE-IT "320"
☐ I'd like a demonstration of DRIVE-IT "320"

Name_____

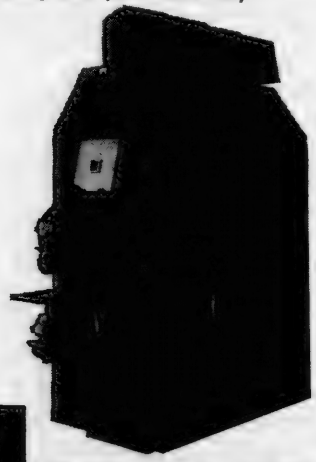
Address_____

City_____ State_____

Easy Installation

Easy and economical. An Olson Direct Fired Heater is almost ready to go to work for you the day it arrives. They are factory assembled and shipped as a complete unit. The installation is simple.—It consists of placing the unit and making power, fuel and stack connections. And remember, the initial cost is negligible because you avoid the old fashioned complicated system.

The fact that Olson Direct Fired Heaters are built rugged for dependable service cannot be denied.—Write for the detailed step-by-step catalog and you'll know why.



Olson

DIRECT FIRED HEATERS

Gas, Oil, Coal or Dual Gas and Oil

ARTHUR A. OLSON & COMPANY
BROAD STREET, CANFIELD, OHIO

(*Continued from page* 138)

clear indication that these jobs were over-radiated. I believe that to be true on most jobs.

Unit ventilator manufacturers offer three or four sizes of heating elements. It's too easy for the contractor to use the largest element, regardless of necessity, just to "play safe".

Lewis Smith
New York, N. Y. *C. A. Dunham Co.*

Canadian Degree-Days for November, 1953*

City	November		Cumulative	
	1953	Normal	1953	Normal
Calgary, Alta.	941	1122	1887	2276
Charlottetown, P.E.I.	(a)	858	(a)	1619
Crescent Valley, B. C.	852	981	1890	2039
Edmonton, Alta	995	1215	2009	2406
Fort William, Ont.	1001	1143	2065	2219
Grande Prairie, Alta.	1170	1218	2296	2510
Halifax, N. S.	611	789	1216	1477
London, Ont.	720	843	1333	1477
Medicine Hat, Alta.	744	1104	1368	1972
Moncton, N. B.	755	936	1582	1813
Montreal, P. Q.	723	948	1424	1689
North Bay, Ont.	864	1017	1792	1975
Ottawa, Ont.	758	984	1523	1783
Penticton, B. C.	696	813	1446	1553
Porquis Junction, Ont.	981	1266	2173	2462
Prince George, B. C.	894	1068	2031	2258
Quebec City, P. Q.	798	1050	1617	1977
Regina, Sask.	1016	1355	1959	2557
St. John, N. B.	747	870	1539	1698
Saskatoon, Sask.	1020	1305	1941	2482
Toronto, Ont.	630	817	1156	1489
Vancouver, B. C.	555	657	1176	1350
Victoria, B. C.	525	462	1150	1172
Windsor, Ont.	657	795	1078	1274
Winnipeg, Man.	988	1302	1844	2376

*These data are supplied through the courtesy of the Meteorological Division, Air Service Branch, Department of Transport, Canada.
(a) Data not available.
The department reports a slight revision in the figure for November for North Bay, Ont., as published in last month's issue. Corrected figure is 570.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available.

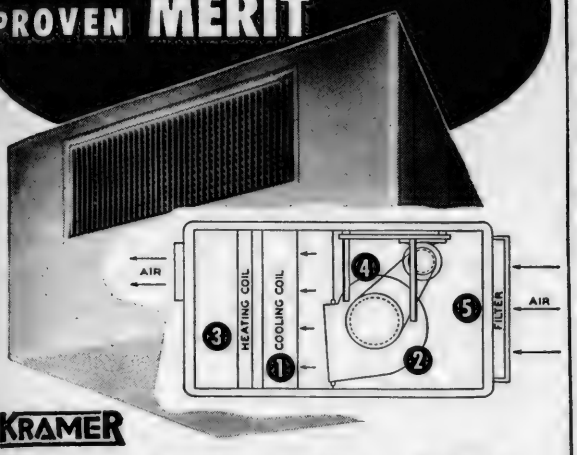
AUTOMOTIVE ENGINEERS MEETING—Annual meeting and engineering display of the Society of Automotive Engineers, at the Conrad Hilton Hotel, Chicago, Ill. Secretary of the Society, 29 W. 39th St., New York 18, N. Y. .....**JANUARY 11-15, 1954.**

ELECTRICAL ENGINEERS MEETING—Winter general meeting of the American Institute of Electrical Engineers, at the Statler Hotel, New York, N. Y. Secretary of the Institute, 33 West 39th St., New York 18, N. Y. .....**JANUARY, 18-22, 1954.**

ASHVE MEETING—Annual meeting of the American Society of Heating and Ventilating Engineers, at the Rice Hotel, Houston, Tex. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. .....**JANUARY 25-27, 1954.**

(*Continued on page* 142)

NEW FEATURES of PROVEN MERIT



KRAMER AIR CONDITIONING UNITS

(1) MUGGY-AIR-CONTROL

It "squeezes" extra moisture from the air on muggy days without reheating, dampers or excessive cooling. No short cycling and uncomfortable conditions.

(2) BLOW-THROUGH DESIGN

Fan-motor assembly always exposed to normal room temperatures. A unique design with many advantages, resulting in — No motor overload and no loss of bearing lubricant from hot air of the heating coils. No corrosion of fan-scroll assembly from moisture carry-over of the cooling coils.

(3) ANTI-SWEAT CONSTRUCTION

Only a small portion of the casing is exposed to cooled air; that section is heavily insulated.

Access doors and grille have scientific anti-sweat designs.

(4) QUIET OPERATION

The fans and motor form an integrated assembly, independently rubber-mounted to the casing. All moving parts are completely isolated by rubber.

(5) FOR FINISHED INTERIORS

Graceful lines with no unsightly belts, motor and guards exposed to view. Finished in hammer gray enamel.

MANY OTHER OUTSTANDING FEATURES.

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KRAMER TRENTON CO.
Trenton 5, N.J.

Kno-Draft recommends Alnor VELOMETER for Precision Air Flow Readings

Ask The W. B. Connor Engineering Corporation how to balance an installation equipped with their Kno-Draft diffusers, and they'll tell you . . . measure the *actual* air delivery—precisely and quickly—with an Alnor Velometer.

Balancing a Kno-Draft equipped installation is a fast and accurate process when using an Alnor Velometer. A few simple readings of the instrument and a twist of the wrist are all that is required to adjust the air flow to the desired amount.

The Velometer is the *only* instantaneous, direct-reading air velocity meter—accurate in all ranges, from high to low—compact, portable, easy to understand and use. Wide assortment of jets and fittings makes this precision instrument ideally suited for all air velocity measurement.

For your air measurement needs, get an Alnor Velometer. You'll save time and money wasted in balancing air distribution on your next installation. If you'd like a copy of the instructions on balancing Kno-Draft diffusers with the Alnor Velometer, just send the coupon below.

Illinois Testing Laboratories
Room 514, 420 N. LaSalle St.
Chicago 10, Ill.

☐ Send Kno-Draft Balancing Instructions
☐ Send Velometer Bulletin 2448-G

Name.....

Company.....

Address.....

City.....Zone.....State.....

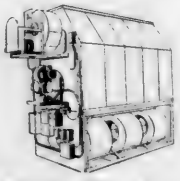
Alnor PRECISION INSTRUMENTS FOR EVERY INDUSTRY

applications unlimited!

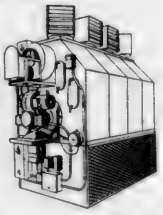
with National Champion direct-fired heaters . . .

Whatever your heating need, you'll find National Champion direct-fired space heaters meet the requirements. Each unit customed designed for efficient, automatic operation. Versatile, compact, rugged—National Champion heaters.

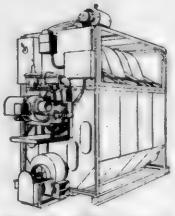
Many models for varied needs!



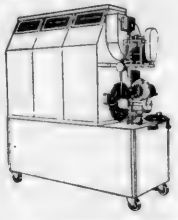
Model "H"—A vertical unit with discharge heads



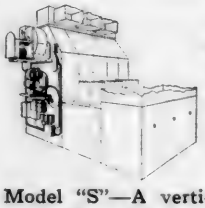
Model "D"—A vertical unit for duct work



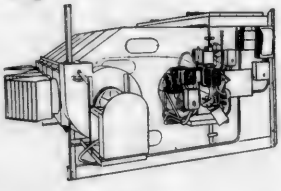
Model "P"—A portable, vertical unit for flexible duty



Model "R"—An inverted unit with discharge heads at bottom



Model "C"—A horizontal ceiling suspension unit for space saving



Model "S"—A vertical unit with side blowers to permit proper location of air mixing dampers

Capacities—200,000 to 2,000,000 BTU/hour

All National Champion heavy oil, light oil and gas fired heaters feature teardrop, stainless steel firebox design, electronic flame failure control, pressure type burners and are wired and flame tested at factory prior to shipment.

National Champion direct-fired heaters are listed by Underwriters' Laboratories, Inc.

Information and specifications available upon request from National Heater Company

NATIONAL CHAMPION HEATERS

a product of National Heater Company, Inc.
Dept. E
2180 Cleora Avenue, St. Paul 4, Minnesota

(*Continued from page* 140)

PLANT MAINTENANCE & ENGINEERING SHOW—The Plant Maintenance & Engineering Show for 1954 will be held at the International Ampitheatre, Chicago, Ill., concurrently with the Plant Maintenance & Engineering Conference at the Hotel Conrad Hilton, Chicago. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. . . . . **JANUARY 25-28, 1954.**

INSTRUMENT SOCIETY CONFERENCE—9th annual regional conference of the Instrument Society of America, at the Statler Hotel, New York, N. Y. Les Butzman, The Swartout Co., 193 Park Ave., New York, N. Y. . . . . **FEBRARY 4, 1954.**

TESTING MATERIALS MEETING—Spring meeting of the American Society For Testing Materials, at the Shoreham Hotel, Washington, D. C. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . . . **MARCH 1-5, 1954.**

CORROSION ENGINEERS CONFERENCE—Tenth annual conference and exhibition of the National Association of Corrosion Engineers, in Kansas City, Mo. A. B. Campbell, Executive Secretary of the Association, 1061 M & M Building, Houston 2, Texas. . . . . **MARCH 15-19, 1954.**

WELDING SOCIETY MEETING—1954 National spring technical meeting of the American Welding Society, at the Hotel Statler, Buffalo, N. Y. J. G. McGrath, national secretary of the Society, 33 W. 39th St., New York 18, N. Y. . . . . **MAY 4-7, 1954.**

WELDING SOCIETY EXPOSITION—1954 Welding and Allied Industry Exposition of the American Welding Society, at the Buffalo Memorial Auditorium, Buffalo, N. Y. J. G. McGrath, national secretary of the Society, 33 W. 39th St., New York 18, N. Y. . . . . **MAY 5-8, 1954.**

INDOOR COMFORT EXPOSITION—The National Indoor Comfort Exposition, at the Commercial Museum, Philadelphia, Pa., in conjunction with the 32nd Convention of the Oil-Heat Institute of America, Inc. R. H. L. Becker, secretary of the Institute, 500 Fifth Ave., New York 36, N. Y. . . . . **MAY 16-20, 1954.**

GAS APPLIANCE MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Drake Hotel, Chicago, Ill. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. . . . . **MAY 19-21, 1954.**

HEATING AND PIPING CONTRACTORS CONVENTION—65th annual convention of the Heating, Piping and Air Conditioning Contractors National Association, at the Hotel Traymore, Atlantic City, N. J. Lloyd B. Gruman, Jr., acting secretary of the Association, 1250 Avenue of the Americas, New York 20, N. Y. . . . . **MAY 24-28, 1954.**

NDHA CONVENTION—Annual convention of the National District Heating Association, at The Greenbrier, White Sulphur Springs, Va. John F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. . . . . **MAY 25-28, 1954.**

PLANT MAINTENANCE SHOW—Western Plant Maintenance Show at the Pan Pacific Auditorium, Los Angeles, Calif. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. . . . . **JULY, 13-15, 1954**

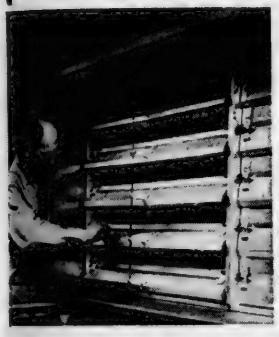
INTERNATIONAL INSTRUMENT CONGRESS—First International Instrument Congress and Exposition, sponsored by The Instrument Society of America, to be held in the Commercial Museum and Convention Hall, Philadelphia, Pa. Richard Rimbach, managing director of the Exposition, 921 Ridge Ave., Pittsburgh 12, Pa. . . . . **SEPTEMBER 13-25, 1954.**

POWER SHOW—21st National Exposition of Power and Mechanical Engineering, at the Comercial Museum, Philadelphia, Pa., to be held under the auspices of The American Society of Mechanical Engineers. Charles F. Roth, manager of the Exposition, 480 Lexington Ave., New York 17, N. Y. . . . . **DECEMBER 2-7, 1954.**

HEATING & VENTILATING EXPOSITION—12th International Heating & Ventilating Exposition, at the International Amphitheatre, Chicago, Ill., held under the auspices of the American Society of Heating and Ventilating Engineers. Charles F. Roth, manager of the Exposition, 480 Lexington Ave., New York 17, N. Y. . . . . **JANUARY 24-28, 1955.**

Johnson & Johnson's

new Shipping Center in Raritan Township, N. J., calls for the maximum in efficiency and trouble-free Multi-blade Damper operation. All of the 60 Damper units installed by the Hutchinson Ventilating Co., White Plains, N. Y., were assembled with . . .



Damper being inspected at the Hutchinson shop. Self-centering feature of "Duro Bracket" assures smooth, non-binding operation.

"DURO BLADE KIT"

PRECISION-ENGINEERED

DAMPER HARDWARE

Thousands of Engineers and Sheet Metal Fabricators specify and use "Duro-Blade-Kit" on their Damper jobs, because...

Model shows how either Parallel or Opposed blade action is accomplished.

- Produces highest quality commercial Damper known.
- Self-centering "Duro Bracket" assures smooth, non-binding operation.
- Sturdy, solid construction permits use on heaviest Dampers.
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- Excellent for making Approved Fire Dampers.

WRITE for Free Demonstration Kit and illustrated Manual on the construction of "Approved" Dampers

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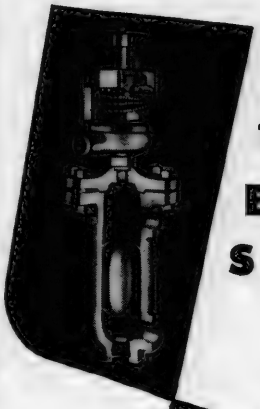
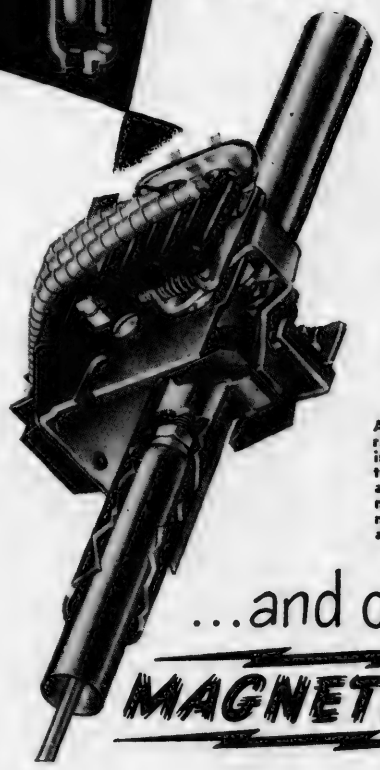
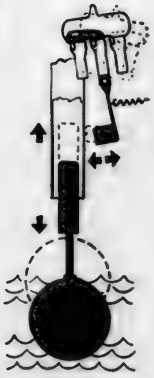


There's No Time Limit on BOILER SAFETY!





A magnetic sleeve, rising and falling within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

...and only **MAGNETROL**

Gives You a Boiler Water Level Control with UNLIMITED OPERATING LIFE

In Magnetrol you have a control mechanism that eliminates the causes of eventual failure *inherent in other controls.* Gone completely are the bellows, diaphragms, electrodes, packing boxes and glands that *must* fail or require servicing sooner or later.

Instead Magnetrol operates by infallible magnetic force. This is the safest system known because it actually makes failure all but impossible! The actuating magnet is rated at 98% of initial strength after 30 years of service.

Magnetrol—and Magnetrol alone—offers UNLIMITED OPERATING LIFE, with least servicing and simplest maintenance.

Magnetrol units are available in single or multi-stage models for all boiler water control applications. Standard boiler units for pressures of 25 to 600 lbs. WSP.

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MAIL THE COUPON NOW FOR FULL FACTS

MAGNETROL, Inc. 2104 S. Marshall Blvd., Chicago 23, Ill.
Gentlemen: Please send me Catalog Section 111 and full information on Magnetrol Boiler Water Level Controls.

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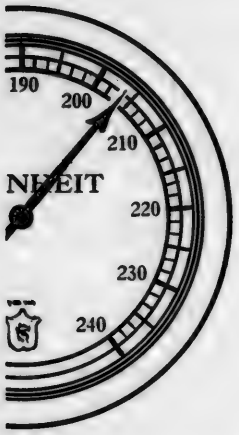


if high fuel oil temperatures are what you need—the Paracoil TYPE "GF"*

INDIRECT GAS FIRED FUEL OIL HEATER is the answer!

With sub-water-line oil heaters, a low circulating boiler water temperature can play havoc with even the best engineered No. 6 oil burner layouts—particularly with the viscous oils now being used!

Our Type "GF" Indirect Gas Fired Heater can give you any desired oil temperature you want—without the use of expensive electric boosters!

APPLICABLE TO ALL TYPES OF OIL FIRED APPARATUS!

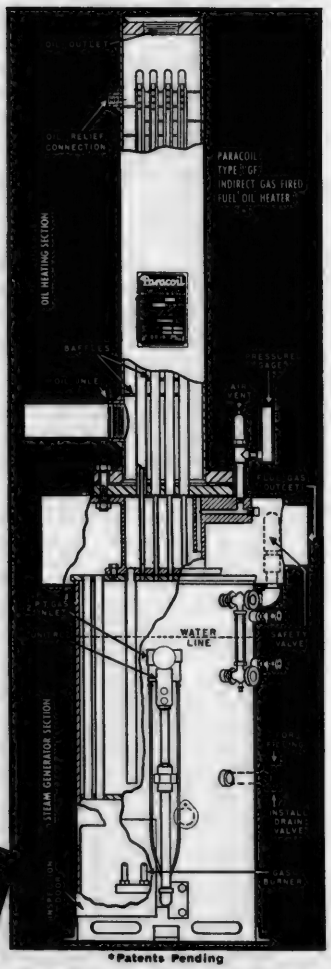
As it is not dependent upon the unit it is servicing for the means of heating the oil, the Type "GF" Heater can be applied to any oil fired apparatus, be it a steam or hot water boiler, a process oven, a dryer or a kiln!

ONE HEATER CAN SERVE MANY BURNERS!

No steam piping required. Heater operates on a closed, internal steam and condensate cycle!

CHECK THESE FEATURES!

Completely factory assembled • Easy to install anywhere, even outdoors • Requires only minimum of floor space • Economical to operate • Wide range of oil heating capacities • Burns any specified type of gas fuel • High oil temperatures at all times • Operation unaffected by normal variation in viscosities of oils being heated.



*Patents Pending

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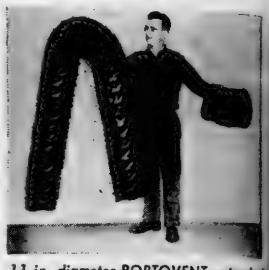
DAVIS ENGINEERING CORPORATION

1064 EAST GRAND ST., ELIZABETH 4, N. J. • 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Move Air or Fumes ECONOMICALLY with new PORTOVENT* Ducting

Available in sizes 4 in. ID to 36 in. ID



11 in. diameter PORTOVENT extended and compressed.

This new spiral-wire reinforced ducting has many features which can mean savings in time and money.

First cost is low. Portovent is easy to connect and install. It can be cut to any length on the job with no weakening or raveling, because it has fully bonded seams. Portovent has excellent lengthwise compressibility . . . is easy to transport and store . . . maintains large sections on sharp bends . . . has excellent air flow characteristics.

Portovent is made with Nylon base (Type SY) or cotton base (Type SC). Both are impregnated with age-resisting Neoprene compound.

Write today for details on this new Portovent Ducting.

*Trade-marks

THE FLEXAUST COMPANY

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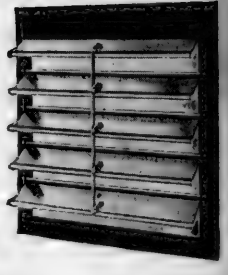
Formerly American Ventilating Hose Co.

FLEXAUST* PORTOVENT* BLOFLEX*

Elgo Ventilating Specialties

FAMOUS AUTOMATIC SHUTTER



Unusually sensitive to air currents, causing the louvers to open instantly when the fan is turned on—and snap shut when the fan is turned off.

The aluminum louvers are weatherstripped. The best fitting shutter on the market.

Sizes from 12" to 72" square—also rectangular.

"Echo" Automatic Ceiling Shutters

Used for attic ventilation. Installed in attic floor at the base of a penthouse, the louvers being operated by the suction of the fan.

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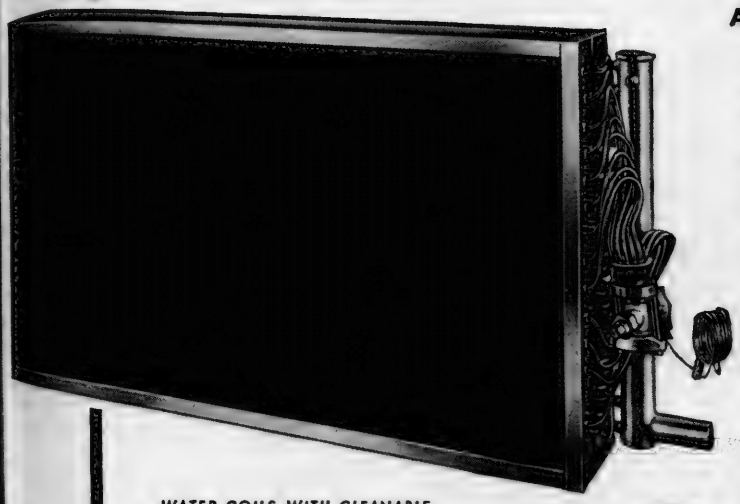
RIGIDBILT AIR CONDITIONING COILS



WATER COILS WITH CLEANABLE TUBES ALSO AVAILABLE

These Important Features Assure RIGIDBILT Superiority...

Maximum heat transfer by heavy aluminum or copper fins, heavy galvanized steel casings. Extruded fin collar entirely surrounds copper tube. Proper circuiting ratio of tonnage to tube length minimizes pressure drop, increases overall coil efficiency. Tested to 300 lb. air pressure under water. Fin spacings variable for ranges of temperature, air velocity, humidity. Tube sizes variable in height and length. Flanged and punched casings. Entire coil custom engineered.

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AIR CONDITIONING & VENTILATING UNITS • UNIT & PRODUCT COOLERS • HEATING & COOLING COILS
ALSO COILS DESIGNED AND BUILT FOR SPECIAL APPLICATIONS

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At left: A view of one of the Equipment rooms, showing some of the General Blowers installed.

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ENGINEERING OFFICES
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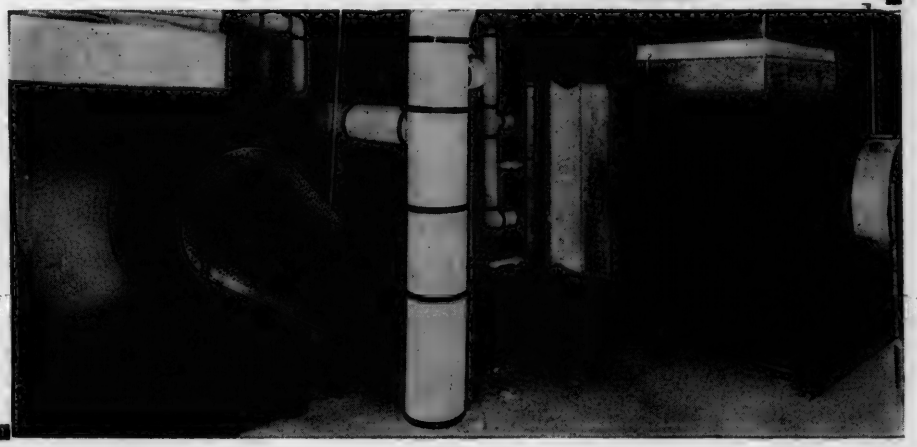

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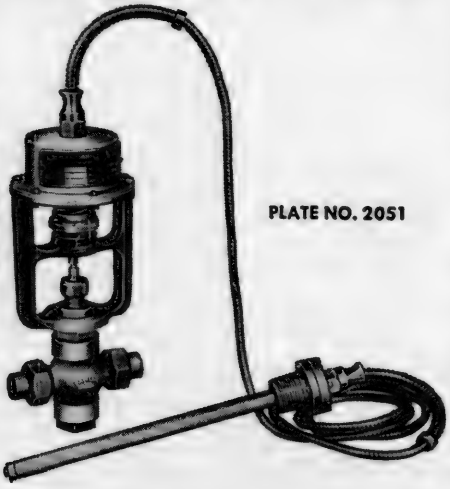
Lawler's "Performance-Tested" design combines pioneering experience with engineering leadership. The use of specially chosen metals assures YOUR customers years of positive, accurate temperature control with lowest maintenance cost . . . the best insurance YOUR REPUTATION can have!

TYPE "S" Temperature Regulators

For accurate temperature control of steam heated hot water tanks . . . vats . . . preheaters . . . process tanks



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- Hydraulically formed one piece bellows.
- Smaller range spread for more accurate control.
- Polished stainless steel valve stems.
- Bronze ball bearing knurled adjustment wheel.
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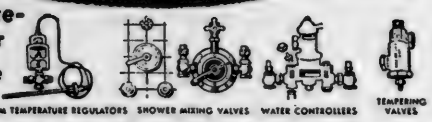
The Lawler Line Thermostatic Controls

"Performance-Tested" for Longer Life



STEAM TEMPERATURE REGULATORS SHOWER MIXING VALVES WATER CONTROLLERS TEMPERING VALVES

LAWLER AUTOMATIC CONTROLS, INC.

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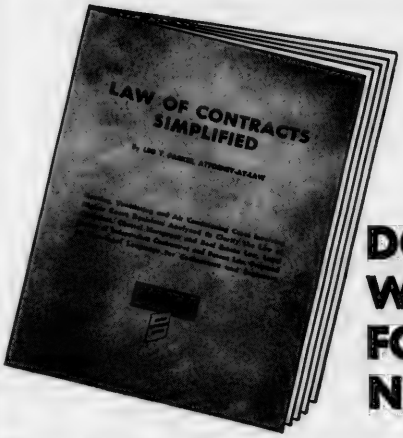

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You may find yourself working for nothing . . . if you work under a poorly drawn contract. You may lose money . . . if you accept work without understanding the terms under which it is to be done.

Written in simple, everyday language, "Contracts Simplified" shows you the pitfalls which are often the cause of costly lawsuits. Using actual court decisions, it illustrates many of the elementary principles of law which everyone should know before drawing—or accepting—a contract. For example, do you know the law covering "fine print?" Do you know the legal aspects of a "cost plus" contract? Do you know when a contract can be rescinded? These are a few of the scores of points which are covered briefly and clearly in "Contracts Simplified." Order a copy today. You'll find it worth many times its cost in the time and trouble it saves you.

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gives you PORTABLE AUTOMATIC COMFORT HEAT where and when you want it!

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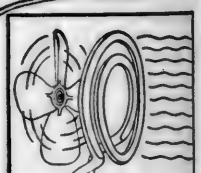

RADIANT & CONVECTED WARMTH

Air is warmed by totally enclosed electric range-type element that's shock-proof, wear-proof.

Now—CHROMALOX offers you an electric heater-thermostat combination that gives instant, cozy radiant heat and gently circulated air that's thoroughly warmed; thermostat controls temperatures in 40 to 80°F. range, can be set to "just prevent freezing;" enclosed dust-proof motor and fan; crinkle finish case. No special wiring needed.

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COSTS NO MORE... get this difference at NO EXTRA cost!

Airsan Air Filters are viscous type, permanent and cleanable.
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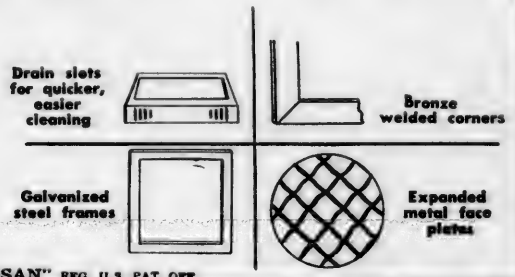

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NICHOLSON MAKES

FREEZE-PROOF Steam Traps for Every Plant Use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates heat transfer in severe weather.

Sizes ¼ inch to 2 inch; pressures to 250 pounds.

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10 to 50 H.P.

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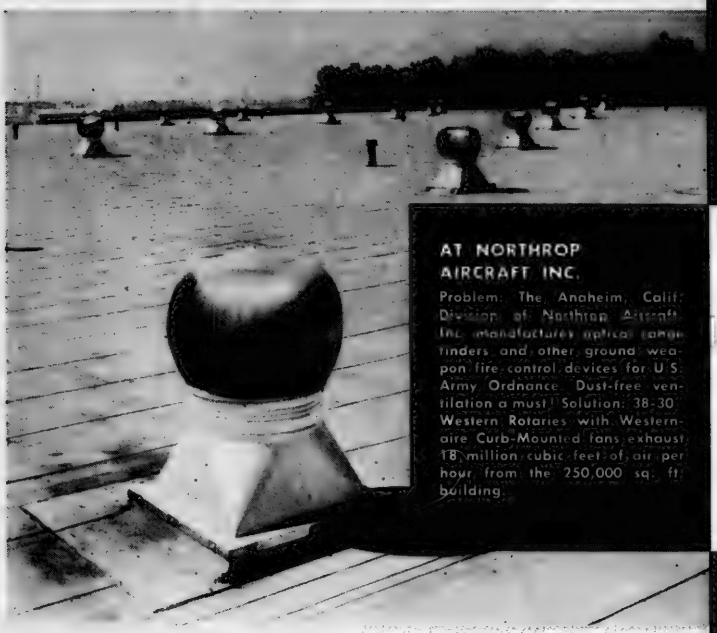

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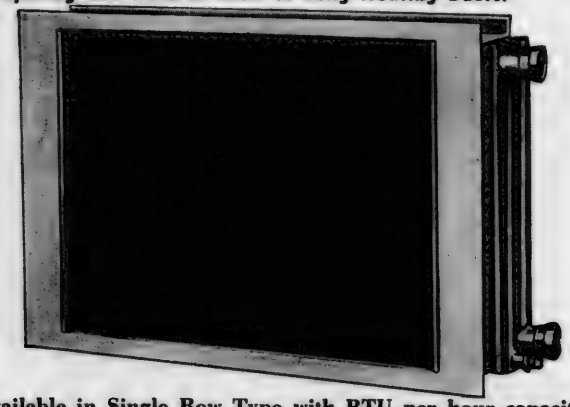

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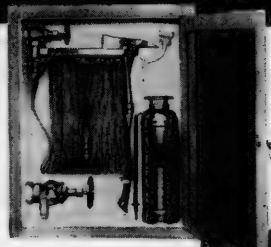

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ALPHABETICAL INDEX OF ADVERTISERS

A

A-J Mfg. Co. ..... *
Acme Industries, Inc. 133
Aerofin Corp. 122
Air Devices, Inc. 134-135
Air Filter Corp. 147
Air-Maze Corp. ..... *
Airtemp Div. of Chrysler Corp. ... 121
Airtherm Manufacturing Co. .... *
Alco Valve Co. 113
Allen-Bradley Co. ..... *
Allen, W. D., Manufacturing Co... 148
Allis-Chalmers Mfg. Company....26-27
American Air Filter Co., Inc. ....
38-44-117
American Blower Corp. 42
American Brass Co. 21
American District Steam Co., Inc... *
American Gilsonite Co. 29
American Machine & Metals, Inc... 1
American Radiator & Standard
Sanitary Corp. 14
Ames Iron Works ..... *
Anemostat Corp. of America 51
Armstrong Machine Works ..... *
Atlas Mineral Products Co. 149
Auer Register Co. ..... *

B

Babcock & Wilcox Co. ..... *
Babcock & Wilcox Co., Tubular
Products Div. 55
Barber-Colman Co. 10-11
Barnebey-Cheney Co. ..... *
Barry Corp. 56
Bell & Gossett Co. ..... *
Bethlehem Steel Co. 131
Binks Manufacturing Co. 123
Bishop & Babcock Mfg. Co. 132
Bituminous Coal Institute 125
Breidert, G. C., Co. ..... *
Buffalo Forge Co. 53
Bundy Tubing Co. 57
Burt Manufacturing Co. ..... *
Bush Manufacturing Co. ..... *
Byers, A. M., Co. 7

C

Carnes, W. R., Co. 61
Chase Brass & Copper Co., Inc. ... 9
Chicago Pump Co. ..... *
Clarage Fan Co. ..... *
Classified Advertisements 149
Cleaver-Brooks Co., Boiler Div. ... *
Committee on Steel Pipe Research 32
Connor Engineering Corp. 119
Copeland Refrigeration Corp. 28
Coyne & Delaney Co. ..... *
Curtis Refrigerating Machine Div.,
Curtis Manufacturing Co. .... *

D

Davis Engineering Corp. 144
Debothezat Fans Div., American
Machine & Metals, Inc. 1
Delco Products Div., General Motors
Corp. ..... *
Dollinger Corp. 45
Dravo Corp. ..... *
Dunham, C. A., Co. ..... *
Duriron Company, Inc. ..... *
Duro-Dyne Corp. 143
Dwyer, F. W., Mfg. Co. ..... *

E

Elgo Shutter & Mfg. Co. 144
Emerson Electric Mfg. Co. 39

F

Farr Company 12-13
Flexaust Co. 144
Flexonics Corp. 23
Frick Company 54

G

Gallaher Co. ..... *
General Blower Co. 145
General Electric Co. ..... *
Glass Fibers, Inc. ..... *
Governair Corp. 136
Grinnell Co., Inc. ...Inside Front Cover
Gustin-Bacon Mfg. Co. 47

H

Halstead & Mitchell 127
Henry Valve Co.....Inside Back Cover
Hoffman Specialty Mfg. Co. .... *

I

Illinois Engineering Co. 44
Illinois Testing Laboratories, Inc... 141
Infra Insulation, Inc. 5
Iron Fireman Mfg. Co. 24

J

Jenkins Bros. 25
Johnson Service Co. 41
Joy Manufacturing Co. ..... *

K

Kennard Corp. 36
Kewanee-Ross Corp. ..... *
Kramer Trenton Co. 141

L

Lawler Automatic Controls, Inc. .. 146
Libbey-Owens-Ford Glass Co. 50

M

Magnetrol, Inc. 143
Marley Company ..... *
Marlo Coil Co. 22
Marsh Heating Equipment Co. ... *
McCord Corp. ..... *
McDonnell & Miller, Inc. ..Back Cover
McQuay, Inc. 30-31
Minneapolis-Honeywell Regulator
Co. 110-111
Modine Manufacturing Co. 58-59
Muckle Manufacturing Co. 138

N

Nash Engineering Co. 62
National Heater Co. 142
National Tube Div., United States
Steel Corp. ..... *
Naylor Pipe Co. 139
Nelson, Herman Div., American Air
Filter Co., Inc. 38
New York Blower Co. 33
Niagara Blower Co. 130
Nicholson, W. H., & Co. 147
North American Mfg. Co. ..... *

O

Olson, Arthur A. & Co. 140

P

Palmer Thermometers, Inc. ..... *
Petro ..... *
Powder Power Tool Corp. 139
Powers Regulator Co. 15-129
Production Planning Co. ..... *
Pur Air Div., Barneby-Cheney Co. *
Pyle-National Co. ..... *

R

Reading Tube Corp. ..... *
Rempe Company 148
Revere Copper & Brass, Inc. 107
Ric-Wil Co. 115
Rigidbilt, Inc. 145

S

Sarco Co., Inc. 37
Sarcotherm Controls, Inc. 20
Skidmore Corporation ..... *
Spence Engineering Co., Inc. 40
Standard Stamping & Perforating
Co. 35
Superior Combustion Industries, Inc. *

T

Taylor Forge & Pipe Works 46
Thrush, H. A. & Co. 52
Trane Co. 18-19
Tube-Turns, Inc. 43
Tuttle & Bailey, Inc. ..... *
Typhoon Air Conditioning Co., Inc. 137

U

Unistrut Products Co. ..... *
United States Air Conditioning Corp. 147
United States Steel Corp. ..... *

W

Wagner Electric Corp. ..... *
Want Advertisements 149
Watts Regulator Co. ..... *
Webster, Warren & Co. 2
Weil-McLain Co. ..... *
Weil Pump Co. ..... *
Western Engineering & Mfg. Co... 148
Westinghouse Electric Corp. 60
Wiegand, Edwin L., Co. 146
Wing, L. J., Mfg. Co. 16-17
Worthington Corp. 48

Y

Yarnall-Waring Co. 49
Young Radiator Co. ..... *
Youngstown Sheet & Tube Co. ... 34

Z

Zonolite Co. ..... *
Zurn, J. R., Mfg. Co. ..... *

*Advertisement appeared in preceding issue.

. . 140

. . *
. . *
. . 139
. 15-129
. . *
Co. *
. . *

. . *
. . 148
. . 107
. . 115
. . 145

. . 37
. . 20
. . *
. . 40

. . 35
nc. *

. 46
. 52
. 18-19
. 43
. *
c. 137

. *
. 147
*

*
149
*
2
*
*
148
60
146
6-17
48

49
*
34

*
*
eced-

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HEAT REMOVED PER POUND OF DRY AIR

Since the wet-bulb temperature is a measure of the total heat of a mixture of dry air and vapor, the amount of heat to be removed in cooling a mixture is the difference between the total heats at the initial and final wet bulb temperatures, as given in these tables. These tables are on the basis of a pound of dry air plus the moisture.

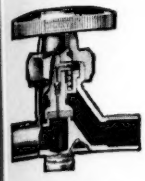
As an example of the use of the tables, how much heat must be removed from air at 90F dry bulb, 70F wet bulb, to cool it to 70F dry bulb and 45F wet bulb?

The initial wet bulb is 70F, final wet bulb 45F. Therefore, under 70F initial wet bulb and opposite 45F final wet bulb find the answer to be 16.39 Btu to be removed from each pound of dry air (plus moisture) to be cooled.

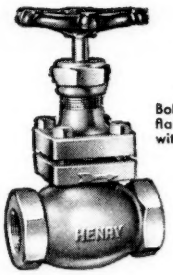
Final Wet Bulb Temp., F	Initial Wet Bulb Temperature, F															
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
	Heat Removed per Lb. Dry Air, Btu															
40	11.20	11.89	12.59	13.31	14.04	14.79	15.56	16.34	17.14	17.96	18.80	19.66	20.54	21.43	22.36	23.30
41	10.74	11.43	12.13	12.85	13.58	14.33	15.10	15.88	16.68	17.50	18.34	19.20	20.08	20.97	21.90	22.84
42	10.26	10.95	11.65	12.37	13.10	13.85	14.62	15.40	16.20	17.02	17.86	18.72	19.60	20.49	21.42	22.36
43	9.78	10.47	11.17	11.89	12.62	13.37	14.14	14.92	15.72	16.54	17.38	18.24	19.12	20.01	20.94	21.88
44	9.29	9.98	10.68	11.40	12.13	12.88	13.65	14.43	15.23	16.05	16.89	17.75	18.63	19.52	20.45	21.39
45	8.79	9.48	10.18	10.90	11.63	12.38	13.15	13.93	14.73	15.55	16.39	17.25	18.13	19.02	19.95	20.89
46	8.28	8.97	9.67	10.39	11.12	11.87	12.64	13.42	14.22	15.04	15.88	16.74	17.62	18.51	19.44	20.38
47	7.76	8.45	9.15	9.87	10.60	11.35	12.12	12.90	13.70	14.52	15.36	16.22	17.10	17.99	18.92	19.86
48	7.23	7.92	8.62	9.34	10.07	10.82	11.59	12.37	13.17	13.99	14.83	15.69	16.57	17.46	18.39	19.33
49	6.69	7.38	8.08	8.80	9.53	10.28	11.05	11.83	12.63	13.45	14.29	15.15	16.03	16.92	17.85	18.79
50	6.14	6.83	7.53	8.25	8.98	9.73	10.50	11.28	12.08	12.90	13.74	14.60	15.48	16.37	17.30	18.24
51	5.58	6.27	6.97	7.69	8.42	9.17	9.94	10.72	11.52	12.34	13.18	14.04	14.92	15.81	16.74	17.68
52	5.01	5.70	6.40	7.12	7.85	8.60	9.37	10.15	10.95	11.77	12.61	13.47	14.35	15.24	16.17	17.11
53	4.43	5.12	5.82	6.54	7.27	8.02	8.79	9.57	10.37	11.19	12.03	12.89	13.77	14.66	15.59	16.53
54	3.83	4.52	5.22	5.94	6.67	7.42	8.19	8.97	9.77	10.59	11.43	12.29	13.17	14.06	14.99	15.93
55	3.23	3.92	4.62	5.34	6.07	6.82	7.59	8.37	9.17	9.99	10.83	11.69	12.57	13.46	14.39	15.33
56	2.61	3.30	4.00	4.72	5.45	6.20	6.97	7.75	8.55	9.37	10.21	11.07	11.95	12.84	13.77	14.71
57	1.98	2.67	3.37	4.09	4.82	5.57	6.34	7.12	7.92	8.74	9.58	10.44	11.32	12.21	13.14	14.08
58	1.33	2.02	2.72	3.44	4.17	4.92	5.69	6.47	7.27	8.09	8.93	9.79	10.67	11.56	12.49	13.43
59	.67	1.36	2.06	2.78	3.51	4.26	5.03	5.81	6.61	7.43	8.27	9.13	10.01	10.90	11.83	12.77
60		.69	1.39	2.11	2.84	3.59	4.36	5.14	5.94	6.76	7.60	8.46	9.34	10.23	11.16	12.10
61			.70	1.42	2.15	2.90	3.67	4.45	5.25	6.07	6.91	7.77	8.65	9.54	10.47	11.41
62				.72	1.45	2.20	2.97	3.75	4.55	5.37	6.21	7.07	7.95	8.84	9.97	10.71
63					.73	1.48	2.25	3.03	3.83	4.65	5.49	6.35	7.23	8.12	9.05	9.99
64						.75	1.52	2.30	3.10	3.92	4.76	5.62	6.50	7.39	8.32	9.26
65							.77	1.55	2.35	3.17	4.01	4.87	5.75	6.64	7.57	8.51
66								.78	1.58	2.40	3.24	4.10	4.98	5.87	6.80	7.74
67									.80	1.62	2.46	3.32	4.20	5.09	6.02	6.96
68										.82	1.66	2.52	3.40	4.29	5.22	6.16
69											.84	1.70	2.58	3.47	4.40	5.34
70												.86	1.74	2.63	3.56	4.50
71													.88	1.77	2.70	3.64
72														.89	1.82	2.76
73															.93	1.87
74																.94

HEAT REMOVED PER POUND OF DRY AIR

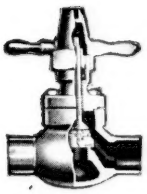
Final Wet Bulb Temp., F.	Initial Wet Bulb Temperature, F.														
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	Heat Removed per Lb. Dry Air, Btu														
40	24.26	25.25	26.26	27.30	28.36	29.44	30.56	31.70	32.87	34.07	35.30	36.56	37.85	39.18	40.54
41	23.80	24.79	25.80	26.84	27.90	28.98	30.10	31.24	32.41	33.61	34.84	36.10	37.39	38.72	40.08
42	23.32	24.31	25.32	26.36	27.42	28.50	29.62	30.76	31.93	33.13	34.36	35.62	36.91	38.24	39.60
43	22.84	23.83	24.84	25.88	26.94	28.02	29.14	30.28	31.45	32.65	33.88	35.14	36.43	37.76	39.12
44	22.35	23.34	24.35	25.39	26.45	27.53	28.65	29.79	30.96	32.16	33.39	34.65	35.94	37.27	38.63
45	21.85	22.84	23.85	24.89	25.95	27.03	28.15	29.29	30.46	31.66	32.89	34.15	35.44	36.77	38.13
46	21.34	22.33	23.34	24.38	25.44	26.52	27.64	28.78	29.95	31.15	32.38	33.64	34.93	36.26	37.62
47	20.82	21.81	22.82	23.86	24.92	26.00	27.12	28.26	29.43	30.63	31.86	33.12	34.41	35.74	37.10
48	20.29	21.28	22.29	23.33	24.39	25.47	26.59	27.73	28.90	30.10	31.33	32.59	33.88	35.21	36.57
49	19.75	20.74	21.75	22.79	23.85	24.93	26.05	27.19	28.36	29.56	30.79	32.05	33.34	34.67	36.03
50	19.20	20.19	21.20	22.24	23.30	24.38	25.50	26.64	27.81	29.01	30.24	31.50	32.79	34.12	35.48
51	18.64	19.63	20.64	21.68	22.74	23.82	24.94	26.08	27.25	28.45	29.68	30.94	32.23	33.56	34.92
52	18.07	19.06	20.07	21.11	22.17	23.25	24.37	25.51	26.68	27.88	29.11	30.37	31.66	32.99	34.35
53	17.49	18.48	19.49	20.53	21.59	22.67	23.79	24.93	26.10	27.30	28.53	29.79	31.08	32.41	33.77
54	16.89	17.88	18.89	19.93	20.99	22.07	23.19	24.33	25.50	26.70	27.93	29.19	30.48	31.81	33.17
55	16.29	17.28	18.29	19.33	20.39	21.47	22.59	23.73	24.90	26.10	27.33	28.59	29.88	31.21	32.57
56	15.67	16.66	17.67	18.71	19.77	20.85	21.97	23.11	24.28	25.48	26.71	27.97	29.26	30.59	31.95
57	15.04	16.03	17.04	18.08	19.14	20.22	21.34	22.48	23.65	24.85	26.08	27.34	28.63	29.96	31.32
58	14.39	15.38	16.39	17.43	18.49	19.57	20.69	21.83	23.00	24.20	25.43	26.69	27.98	29.31	30.67
59	13.73	14.72	15.73	16.77	17.83	18.91	20.03	21.17	22.34	23.54	24.77	26.03	27.32	28.65	30.01
60	13.06	14.05	15.06	16.10	17.16	18.24	19.36	20.50	21.67	22.87	24.10	25.36	26.65	27.98	29.34
61	12.37	13.36	14.37	15.41	16.47	17.55	18.67	19.81	20.98	22.18	23.41	24.67	25.96	27.29	28.65
62	11.67	12.66	13.67	14.71	15.77	16.85	17.97	19.11	20.28	21.48	22.71	23.97	25.26	26.59	27.95
63	10.95	11.94	12.95	13.99	15.05	16.13	17.25	18.39	19.56	20.76	21.99	23.25	24.54	25.87	27.23
64	10.22	11.21	12.22	13.26	14.32	15.40	16.52	17.66	18.83	20.03	21.26	22.52	23.81	25.14	26.50
65	9.47	10.46	11.47	12.51	13.57	14.65	15.77	16.91	18.08	19.28	20.51	21.77	23.06	24.39	25.75
66	8.70	9.69	10.70	11.74	12.80	13.88	15.00	16.14	17.31	18.51	19.74	21.00	22.29	23.62	24.98
67	7.92	8.91	9.92	10.96	12.02	13.10	14.22	15.36	16.53	17.73	18.96	20.22	21.51	22.84	24.20
68	7.12	8.11	9.12	10.16	11.22	12.30	13.42	14.56	15.73	16.93	18.16	19.42	20.71	22.04	23.40
69	6.30	7.29	8.30	9.34	10.40	11.48	12.60	13.74	14.91	16.11	17.34	18.60	19.89	21.22	22.58
70	5.46	6.45	7.46	8.50	9.56	10.64	11.76	12.90	14.07	15.27	16.50	17.76	19.05	20.38	21.74
71	4.60	5.59	6.60	7.64	8.70	9.78	10.90	12.04	13.21	14.41	15.64	16.90	18.19	19.52	20.88
72	3.72	4.71	5.72	6.76	7.82	8.90	10.02	11.16	12.33	13.53	14.76	16.02	17.31	18.64	20.00
73	2.83	3.82	4.83	5.87	6.93	8.01	9.13	10.27	11.44	12.64	13.87	15.13	16.42	17.75	19.11
74	1.90	2.89	3.90	4.94	6.00	7.08	8.20	9.34	10.51	11.71	12.94	14.20	15.49	16.82	18.18
75	.96	1.95	2.96	4.00	5.06	6.14	7.26	8.40	9.57	10.77	12.00	13.26	14.55	15.88	17.24
76		.99	2.00	3.04	4.10	5.18	6.30	7.44	8.61	9.81	11.04	12.30	13.59	14.92	16.28
77			1.01	2.05	3.11	4.19	5.31	6.45	7.62	8.82	10.05	11.31	12.60	13.93	15.29
78				1.04	2.10	3.18	4.30	5.44	6.61	7.81	9.04	10.30	11.59	12.92	14.28
79					1.06	2.14	3.26	4.40	5.57	6.77	8.00	9.26	10.55	11.88	13.24
80						1.08	2.20	3.34	4.51	5.71	6.94	8.20	9.49	10.82	12.18



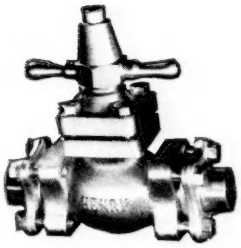
PACKLESS VALVE
With balanced-action



AMMONIA VALVE
Bolted Bonnet — screw or flanged connections. Also with screwed bonnet, sizes 1" and under



WING CAP VALVE
Non-ferrous



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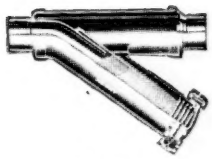
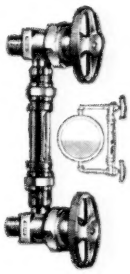
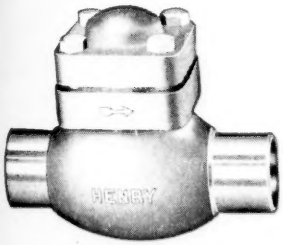
STRAINER
Angle type with patented distortion-proof flange



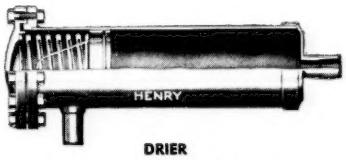
Y-STRAINER
Brass plated. Welded steel construction with forged brass connections. Size ⅜" O. D. S. through 4⅛" O. D. S.



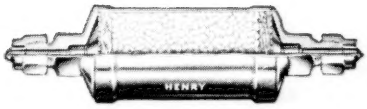
BALANCED-ACTION PACKLESS LIQUID LEVEL GAUGES
Valves are backseating—diaphragms may be inspected or replaced without loss of liquid. Conforms with all safety code requirements.



CHECK VALVE
Piston Type For Freon. Sizes ⅞" through 4⅛" O. D. S.



DRIER
Cartridge type 12 to 500 cu. in. capacity. Sizes ⅞" to 2⅛" O.D.S



DRIER
Large diameter and capacity—minimum pressure drop.

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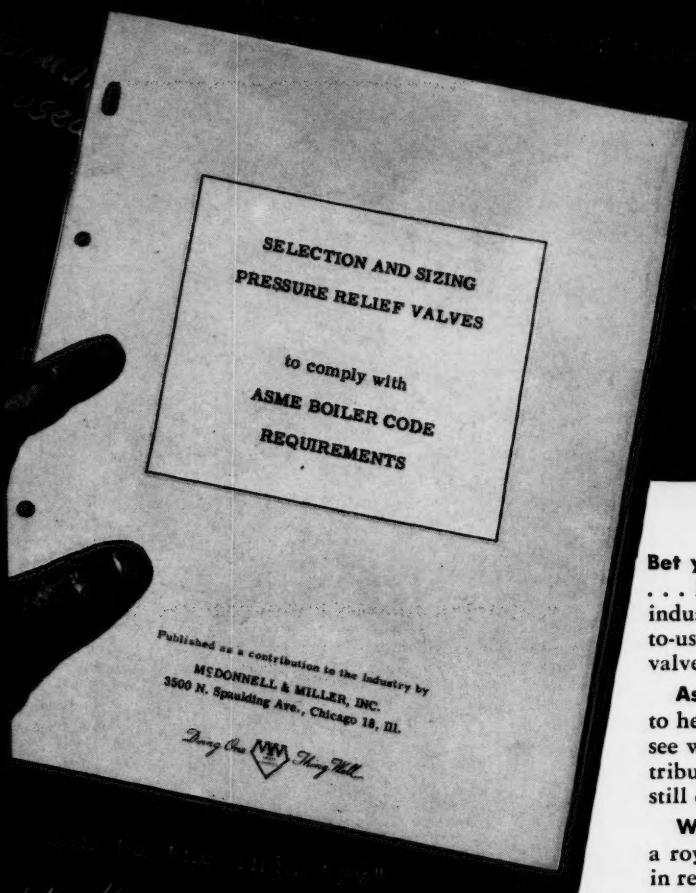
SELECTION AND SIZING
PRESSURE RELIEF VALVES
to comply with
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REQUIREMENTS
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Doing One Thing Well

Bet you'll have good things to say about this booklet, too . . . It has been compiled, as a contribution to the heating industry, to satisfy the many requests for complete and easy-to-use data covering the selection and sizing of pressure relief valves in compliance with ASME Boiler Code requirements.

As soon as it was off the press we mailed out a few copies to heating men to see how it would strike them . . . and you see what happened. The response was startling. Some of the tributes — all unsolicited — are quoted here . . . and they're still coming in!

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